Systems Management

Professional User's Manual

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1. Introduction

This document is a professional user's manual that follows a series of practical tasks set by the Institute of Public Administration as the module assignment associated with the Systems Management module of the Masters in Computer Science (Conversion) 2013-2014 at University College Dublin.

The full texts of the module assignment are provided in Appendices B and C hereunder.

The required tasks are broken into two parts, A and B. Part A relates to network-based installation of Windows operating systems and the enforcement of full drive encryption, while part B relates to the setting up of server operating systems and the configuring of servers, networks and Microsoft's Active Directory Domain Service.

This user manual explains the reasons why the required tasks would be carried out in an enterprise environment, highlighting the benefits and drawbacks of approaches where applicable, and then describes in writing, with the aid of annotated screenshots, the steps that need to be taken to complete each of the relevant tasks.

The manual has been written for a trainee IT administrator, with the aim of instructing said trainee as to how the relevant tasks would be carried out, and references are provided where pertinent, to facilitate further learning.

The manual is broken up into parts A and B, with sub-sections relating to each task required to be carried out, as listed in the table of contents above.

The instructions for each task are provided at the beginning of each sub-section in italics, and the description of each task generally takes the form of a preamble describing the reasons for carrying out said task along with any related advantages and/or disadvantages, followed by an overview of any system requirements that may apply, and finally a step-by-step description of how the task is carried out, employing screenshots as a visual aid. Screenshots are located immediately after the text to which they relate.

References have been provided in adherence with APA formatting, however in addition to references being listed in Appendix A, as per the recommendations of the APA guidelines, references are also included as footnotes at the bottom of the page they appear on. The user manual has entailed a lengthy document and it was felt that same page referencing would be of assistance to the reader.

Part A

2. Part A - Task A1

Using Virtual Machines to mimic the use of Physical Machines, document and Install Microsoft Windows 7 using the Lite Touch Installation (LTI) method.

2.1 Preamble

Microsoft provide several different methods for the installation of windows 7, ranging from manual methods such as inserting a DVD, to completely automated methods that can be effected over a network or via the cloud. These fully automated methods are known as "non-touch" installations.

Installation methods can be categorised as follows:

- High Touch Installation (HTI)
- Lite Touch Installation (LTI)
- Zero Touch Installation (ZTI)

2.1.1 High Touch Installation

The High Touch Installation requires the manual configuration of each system, using an installation DVD or standard image (ISO file) to manually install the operating system individually on every computer. When employing the High Touch Installation on a larger environment, a single installation is carried out, and an image of the installation is created using the ImageX tool that is included as part of the Windows Automated Installation Kit (AIK).

2.1.2 Zero Touch Installation

The Zero Touch Installation is a fully automated means of installing windows that is typically employed in larger environments with 500 or more computers. It is considered to require a high level of system administration competency, as well as a significant budget compared to other installation methods. This method uses System Center Configuration Manager to deploy and update servers, client computers and devices on a network.

2.1.3 Lite Touch Installation (LTI)

The Lite Touch Installation approach that is described hereunder requires some human interaction in the initial stages of the installation but is thereafter automated. The approach works well in environments with more than 150 computers.

The Lite Touch Installation method described below describes the deployment of Windows 7 using the Windows Automated Installation Kit (Windows AIK).

The procedure follows the step by step instructions provided by Microsoft for how to configure and deploy a Windows image on Microsoft TechNet, the Microsoft web portal and web service for IT professionals[1].

A six step process describes the creation of a valid answer file that is used to install windows 7, the preparation of a bootable Windows Preinstallation Environment (Windows PE), and the deployment of a custom Windows image from a network share. The five steps are as follows:

1. Installation of the Windows Automated Installation Kit
2. Building an Answer File
3. Building a Reference Installation
4. Creating Bootable Windows PE Media
5. Capturing the Installation onto a Network Share
6. Deploying from a Network Share

2.2 System Requirements

- A Windows 7 product DVD disc or Windows 7 .iso file as is described in this manual.
- A Windows AIK DVD disc or Windows AIK .iso file as is described in this manual, which is available at the download center on the Microsoft website[2].
- A technician computer
  - A virtual machine hereafter referred to as the technician computer is created with Windows 7 installed on it.
  - The creation of virtual machines, using VMWare Workstation 9 is outside the scope of this user manual, however for reference purposes, the steps involved in this process, as described in a previously prepared user's manual are included as Appendix D.
  - This is the computer on which we will install the Windows Automated Installation Kit (Windows AIK).
- A reference computer
  - A virtual machine hereafter referred to as the reference computer is created with no operating system installed on it.
  - This is the computer where we will install a customized installation using the Windows 7 .iso file and an answer file.
  - Once installed, we will capture and store an image of the installation on a network share.
- Network connectivity between the technician and reference computers.

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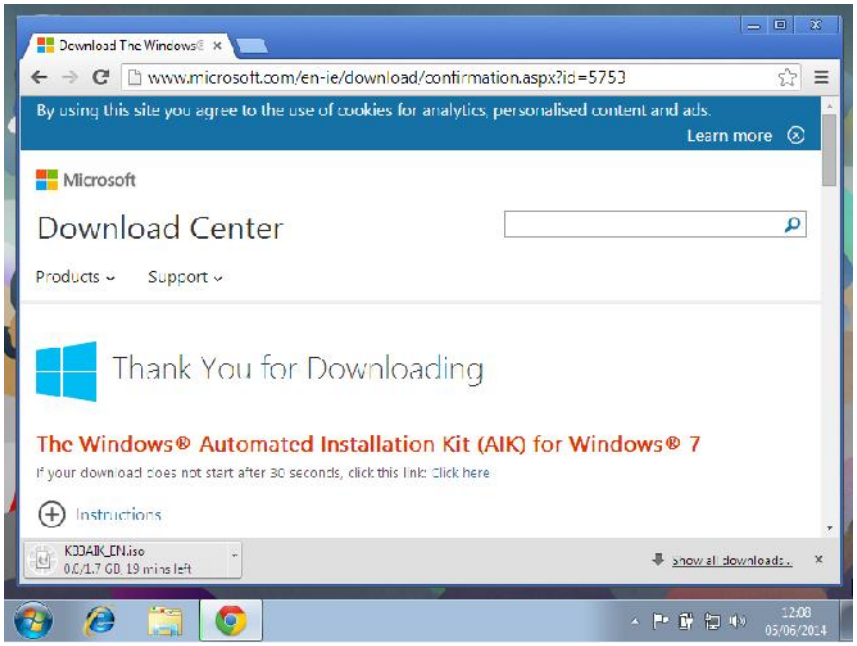
[1] http://technet.microsoft.com/en-us/library/dd349348(v=ws.10).aspx. Accessed July 1, 2014.

[2] http://go.microsoft.com/fwlink/?LinkId=136976. Accessed July 1, 2014.

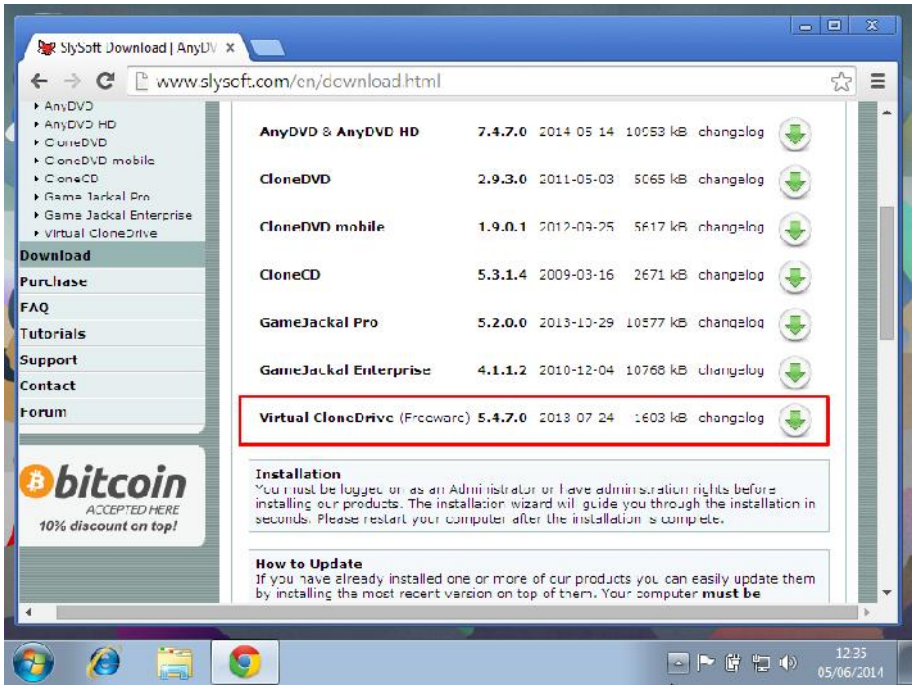
2.3 Procedure

2.3.1 Step 1 - Installation of the Windows Automated Installation Kit (Windows AIK)

Firstly, using our technician computer, we download the Windows AIK from Microsoft's website[3].

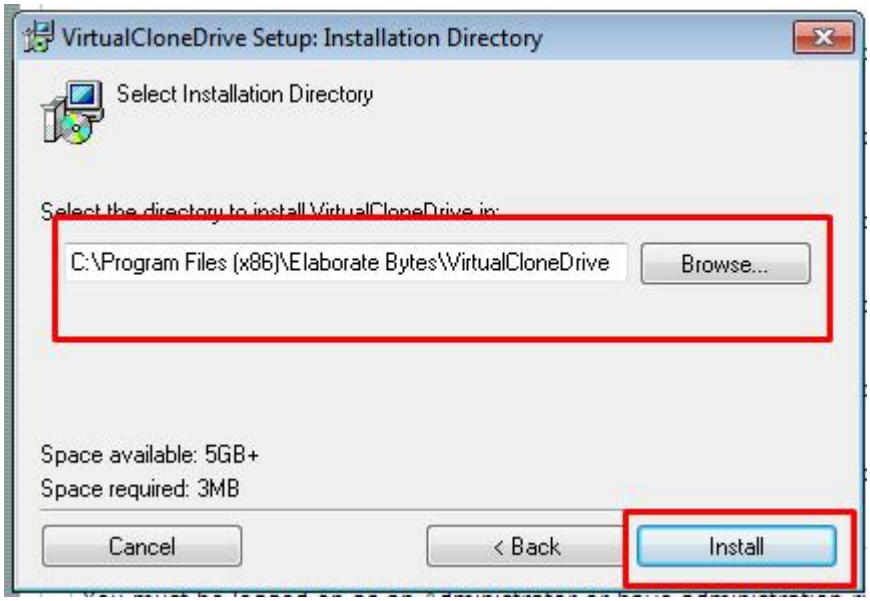

www.microsoft.com/en-ie/download/confirmation.aspx?id=5753
By using this site you agree to the use of cookies for analytics, personalised content and ads.
Learn more
Microsoft
Download Center
Products
Support
Thank You for Downloading
The Windows® Automated Installation Kit (AIK) for Windows® 7
If your download does not start after 30 seconds, click this link: Click here
Instructions
KB3AIK_EN.iso
0.0/1.7 GB, 19 mins left
show all downloads...

After the download has completed we then install the AIK download. This can be done by burning the downloaded *.iso image file to a DVD disk and running it. As an alternative, in order to expand our knowledge, we will download a program that will emulate the image file onto a virtual drive, we will use Virtual CloneDrive, provided by SlySoft[4].

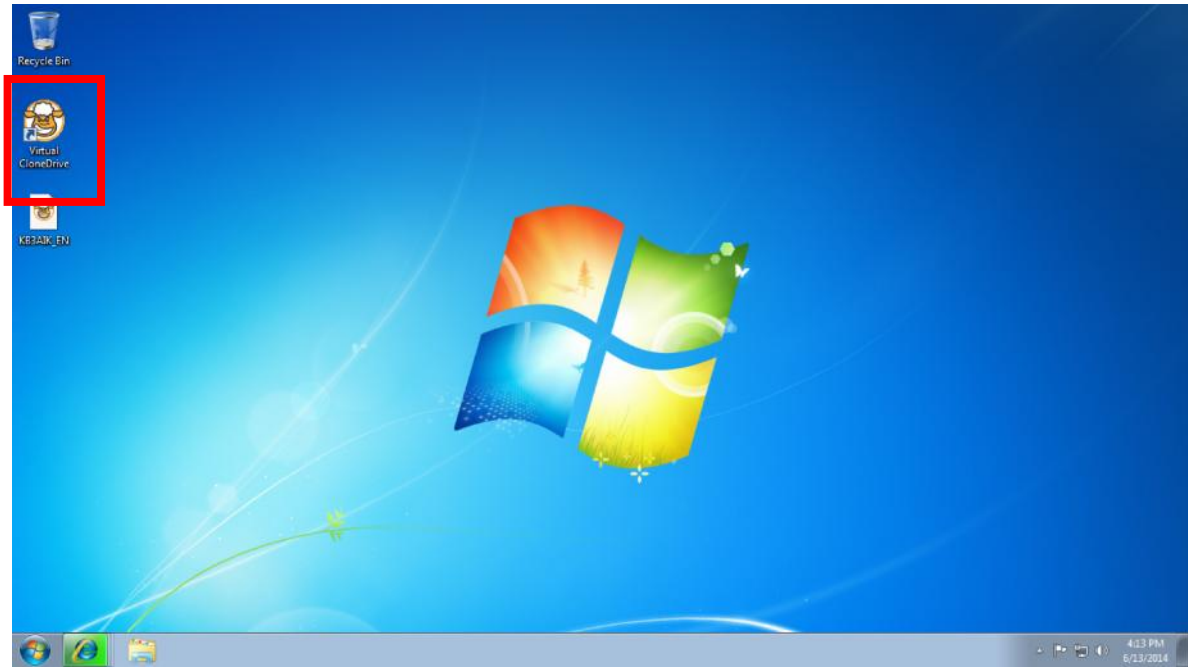


[3] http://go.microsoft.com/fwlink/?LinkId=136976. Accessed July 1, 2014.
[4] http://www.slysoft.com/en/download.html. Accessed July 1, 2014.

Once Virtual CloneDrive has been downloaded we launch the installation using the *.exe file that we have downloaded, following the steps on the installation wizard.



Once the installation is complete, the installation window will close and we launch the Virtual Clone Drive software from the desktop.

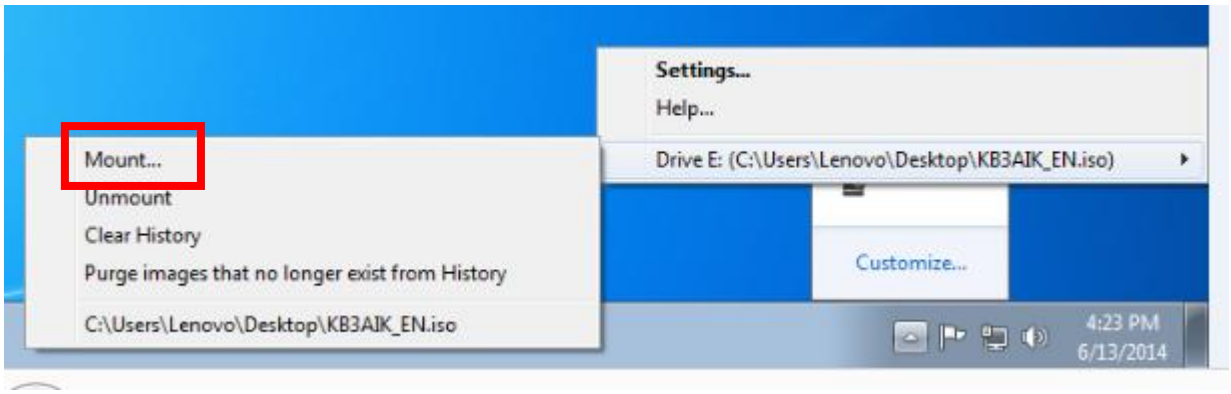


A selection pane is opened prompting us as to how many drives we wish to create - we select one virtual drive for the installation of the Windows AIK

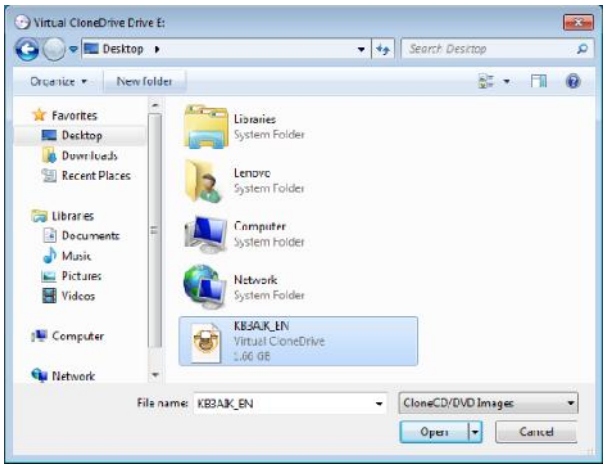
Our next step is to mount the image (*.iso) file that we downloaded to the drive we have just created.

We click on the icon in the bottom right of the desktop highlighted in the screenshot below to open a pop-up menu, where we right click on the larger highlighted area.

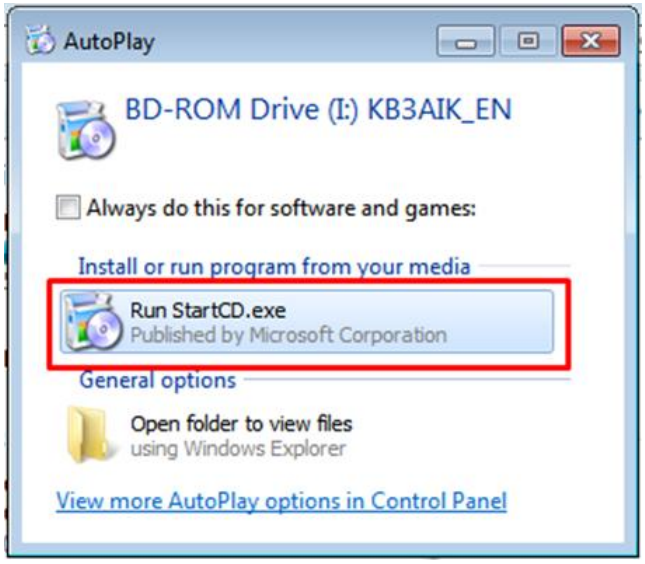
On the resultant menu, we hover over the virtual drive and select "mount" from the pop-out menu.



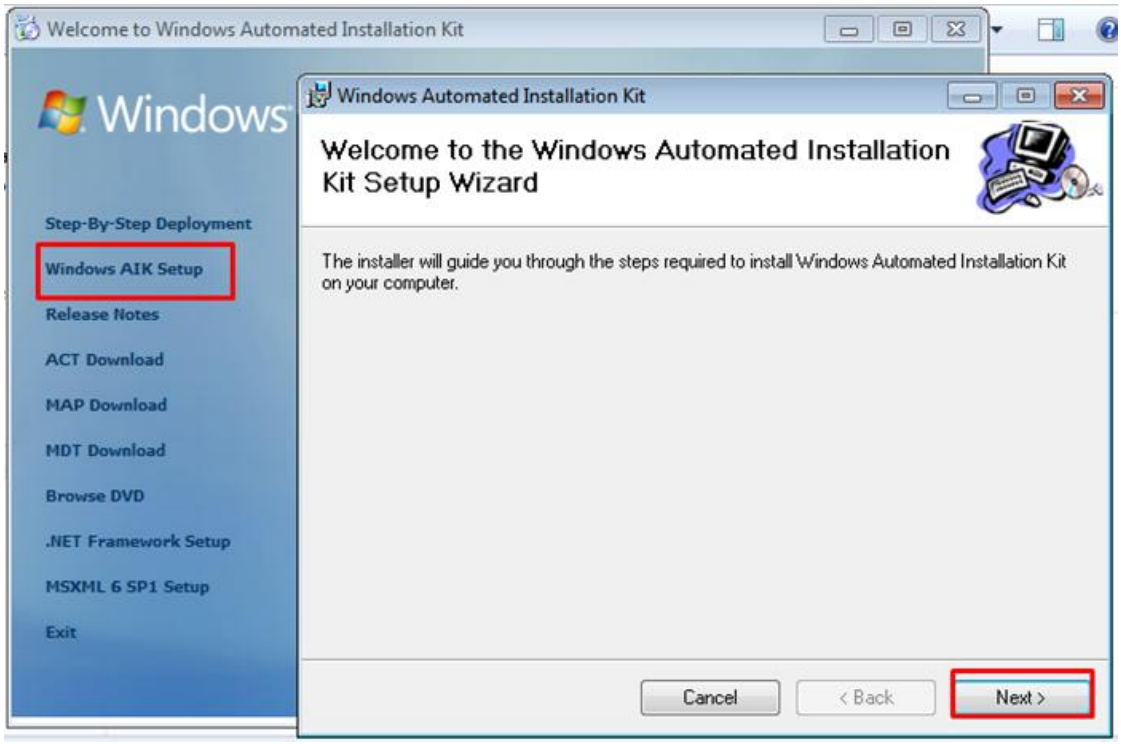
A new window is opened and we select the Windows AIK image file from where we have saved it on the desktop to be mounted to the virtual drive.



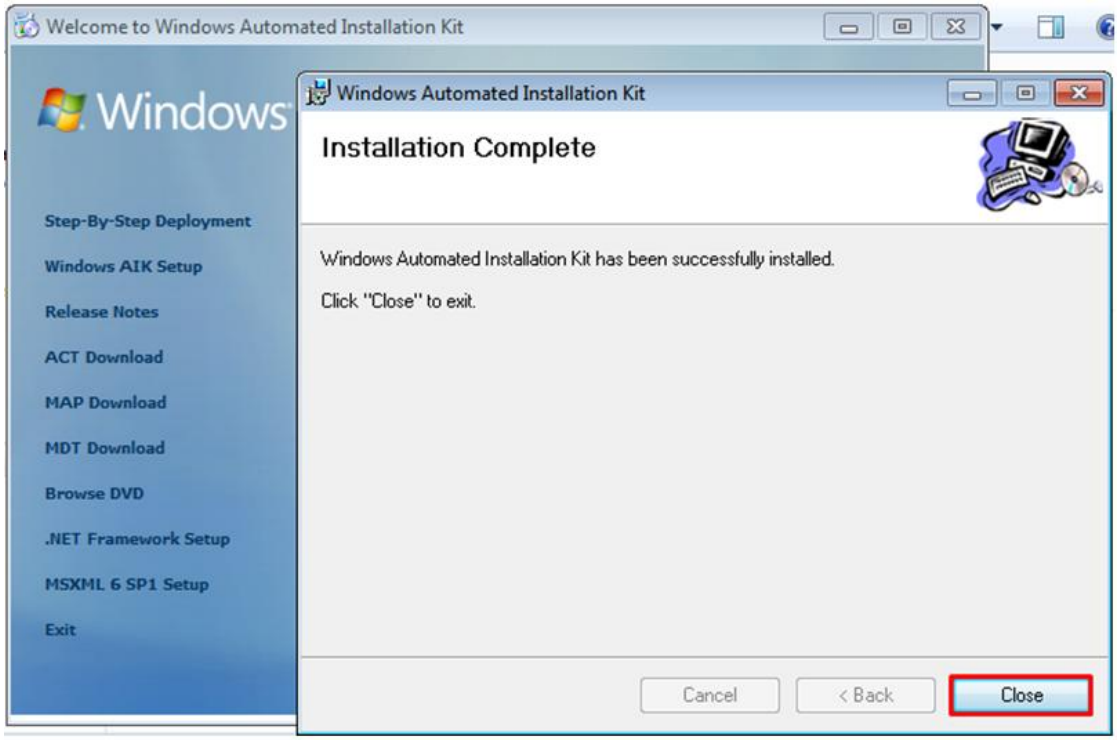
Once mounted to the virtual drive, a new window opens emulating that a disk has just been inserted, and we select to run the StartCD.exe.


AutoPlay
BD-ROM Drive (I:) KB3AIK_EN
Always do this for software and games:
Install or run program from your media
Run StartCD.exe
Published by Microsoft Corporation
General options
Open folder to view files
using Windows Explorer
View more AutoPlay options in Control Panel

A new window will appear and show the options for installation. We select 'Windows AIK Setup' and follow the instructions on the setup wizard for installation.



Once complete, we close the installer, highlighted below.



2.3.2 Step 2 - Building an Answer File

Now that the Windows AIK is installed on out technician computer, we can build an answer file.

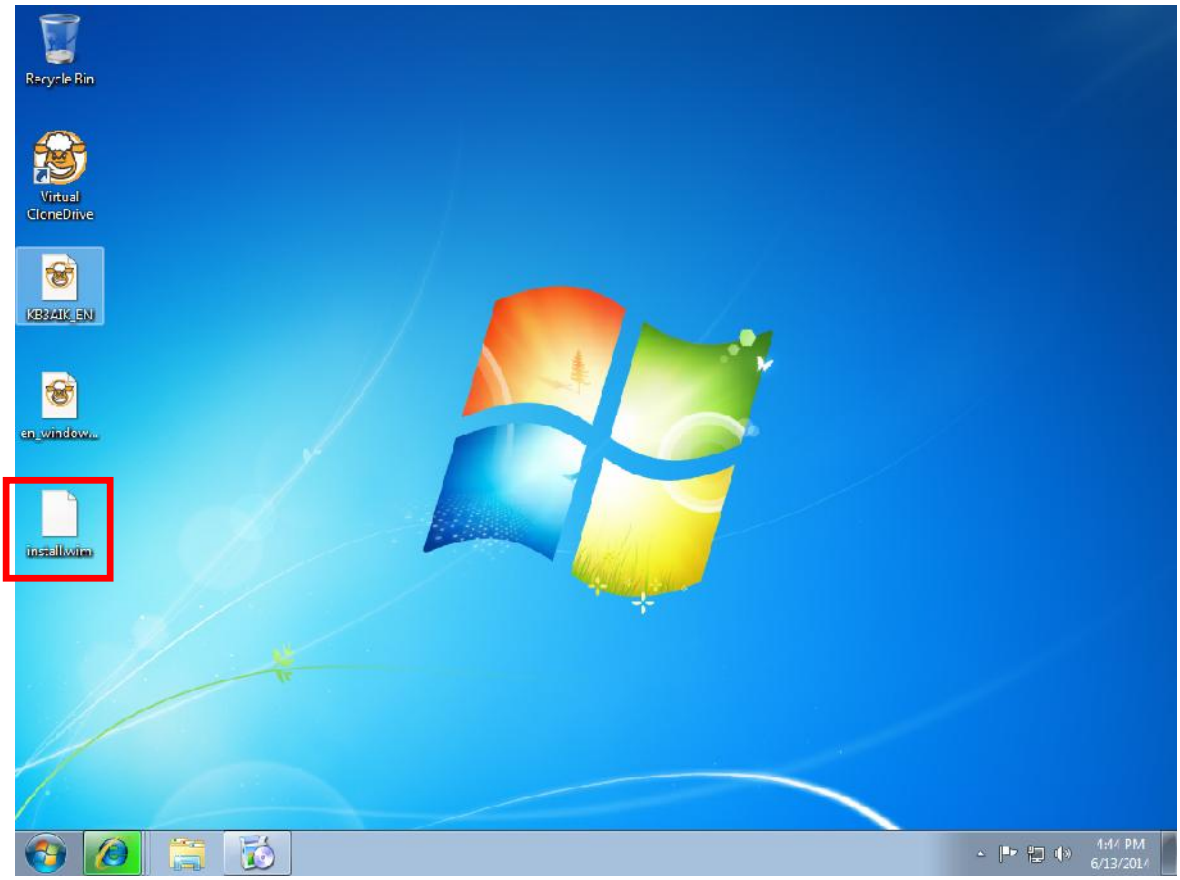
An answer file is used to configure Windows settings during installation and it contains all of the settings that are needed for an unattended installation so that during installation a user is not prompted with user interface pages.

Hereunder we describe the process for creating an answer file using Windows System Image Manager (Windows SIM). Windows SIM is a utility for creating and modifying unattended answer files and configuration sets.

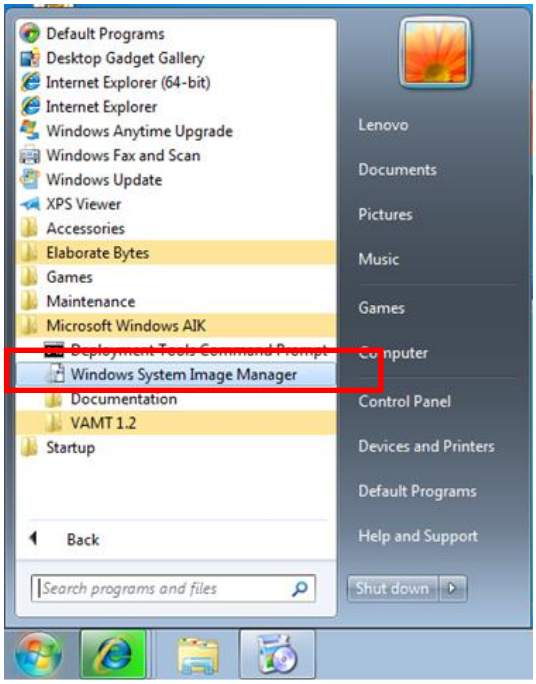
We will copy a Windows image file (.wim) to our technician computer, and then create a simple answer file that includes basic Windows Setup configuration and minimum Windows Welcome customizations.

Having copied our Windows 7 .iso file onto a blank DVD, on our technician computer, we insert the DVD.

We open the \Sources directory on our Windows 7 .iso file and copy the Install.wim file located there to the desktop of the technician computer.

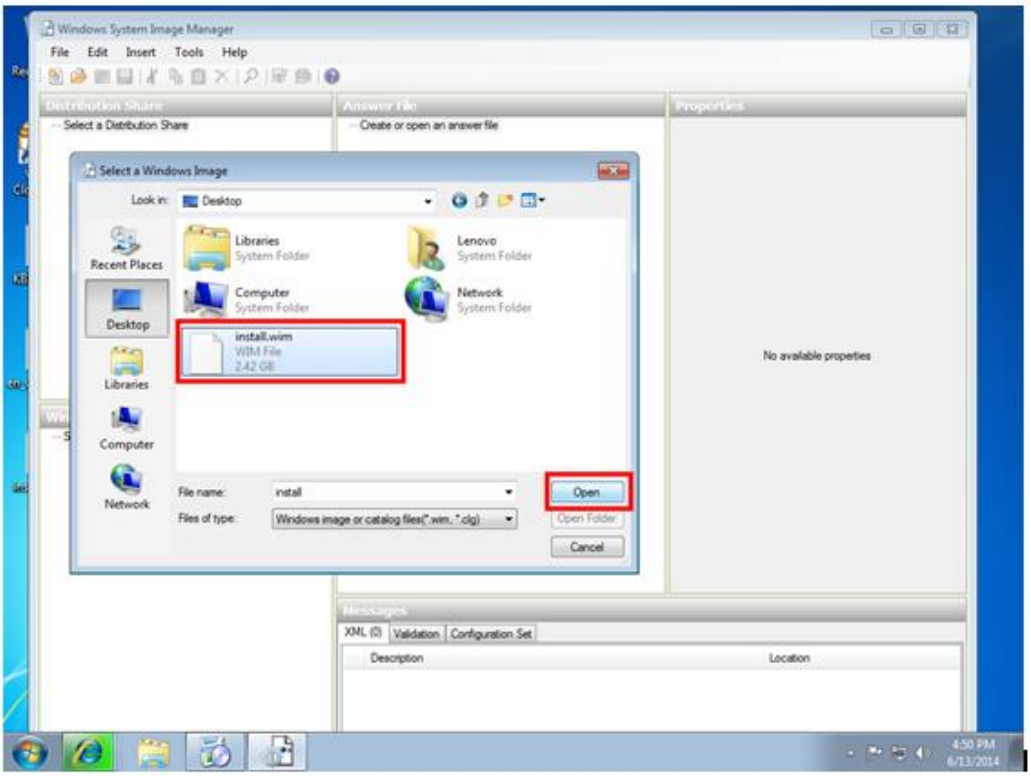


We then open Windows SIM by clicking click Start, All Programs, Microsoft Windows AIK, and then Windows System Image Manager.



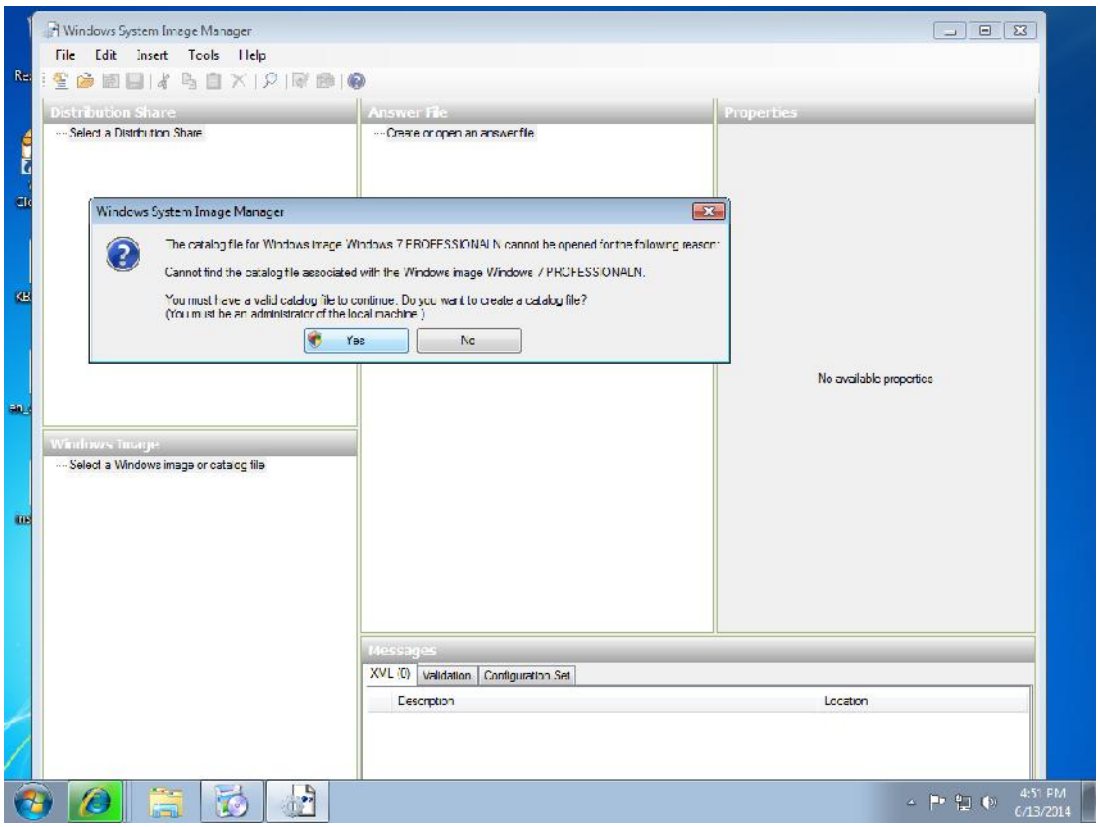
On the Windows SIM file menu we click Select Windows Image.

In the Select a Windows Image dialog box, we navigate to the desktop where we saved Install.wim above, and then click Open.

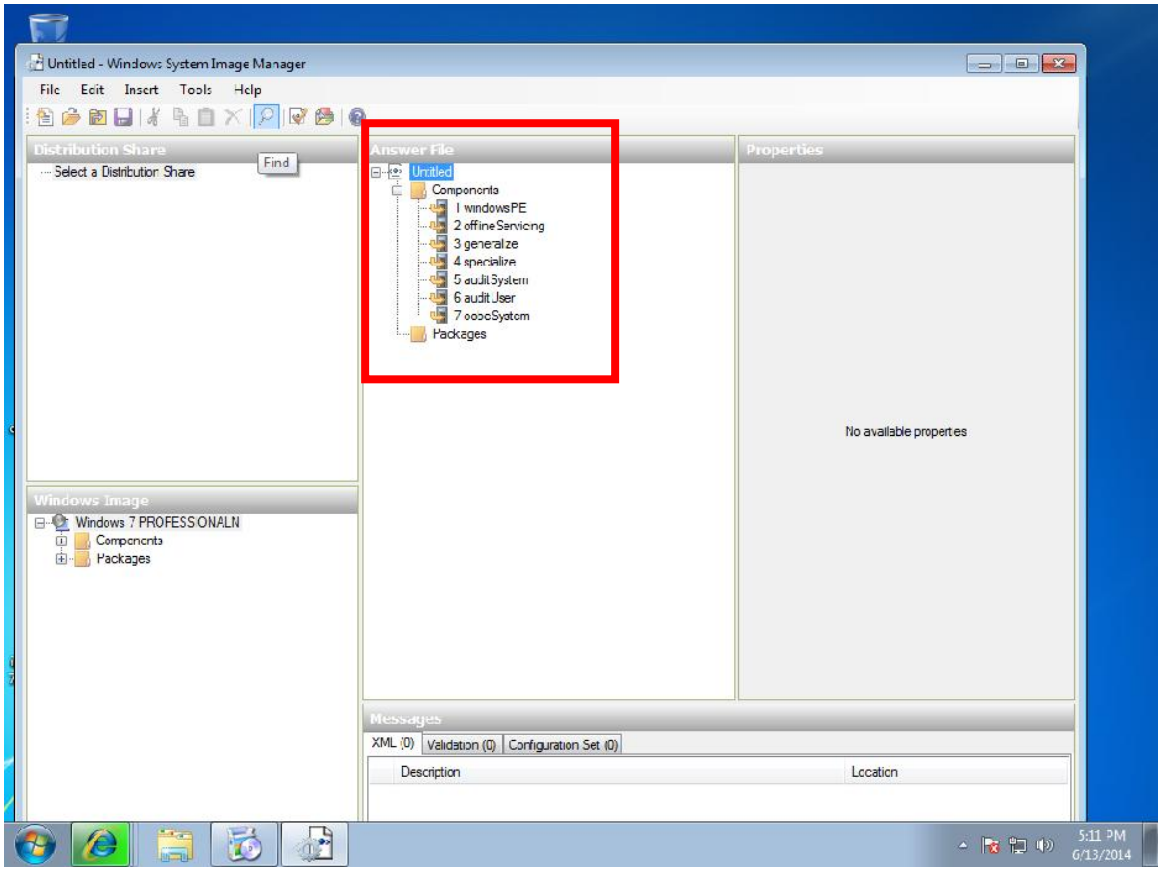


We are then prompted to select an image, we choose the Windows image that we want to install, and then click OK.

At the prompt to create a catalog file we click Yes to generate the file.

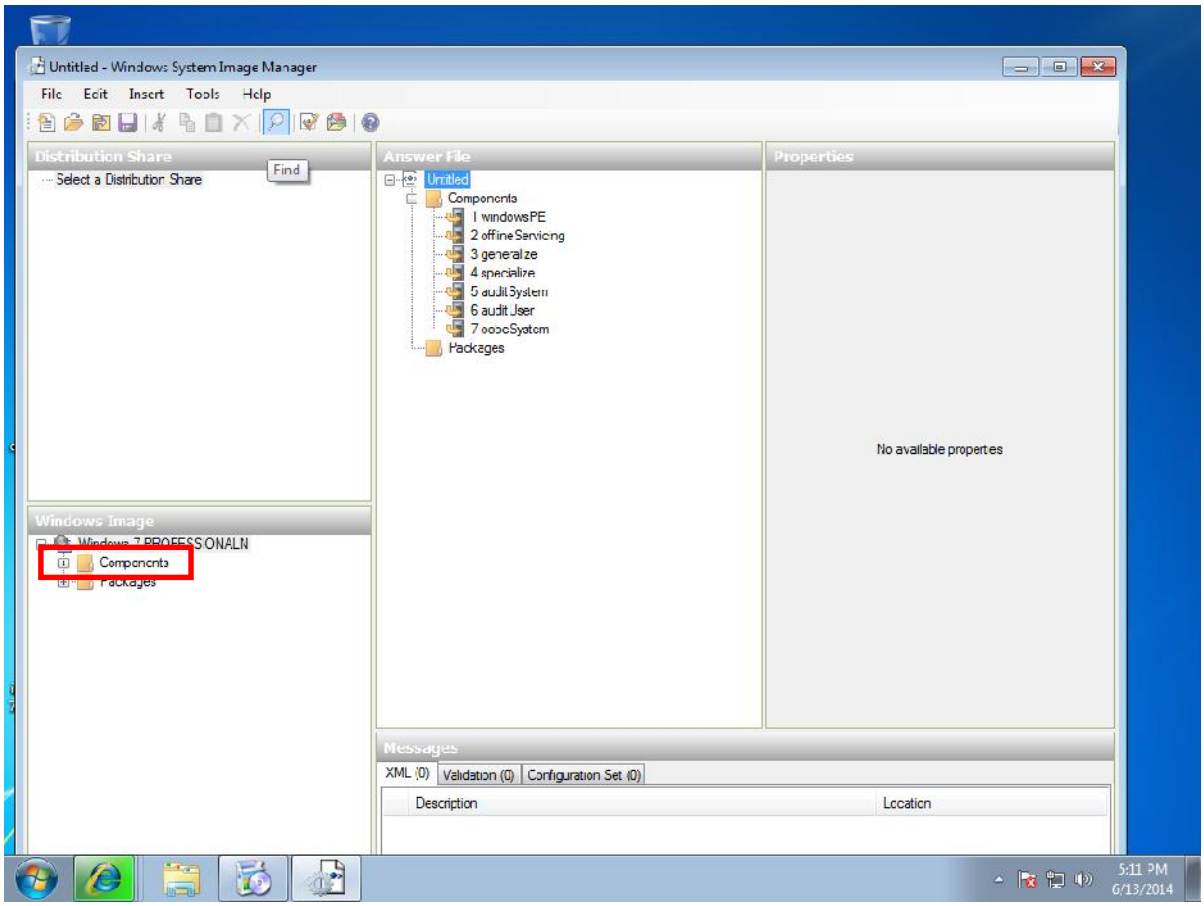


We click File, New Answer File, and an empty answer file appears in the Answer File pane.



Our next step is to define basic disk configuration and Windows Welcome settings.

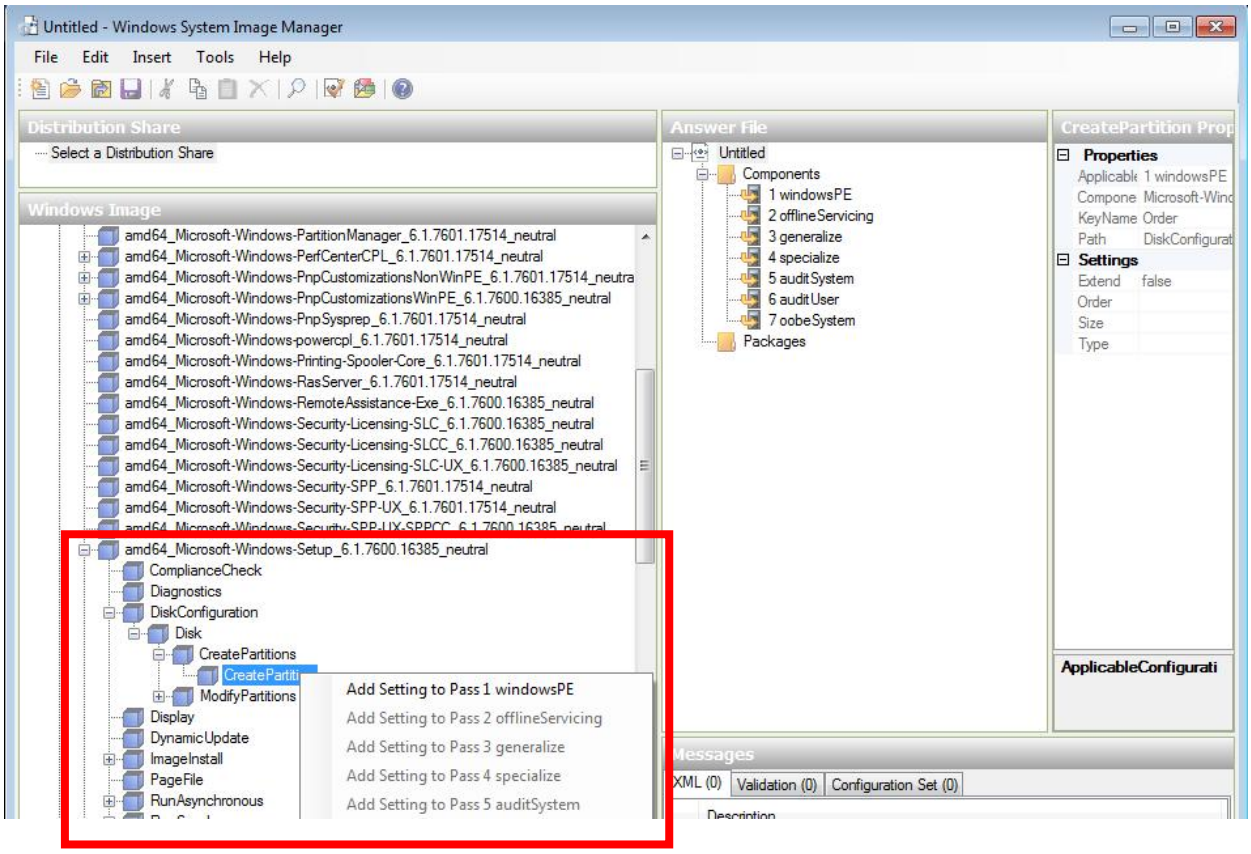
In the Windows SIM Windows Image pane, we expand the Components node to display available settings that can be copied to our answer file.



On the expanded list of components, we add the components we wish to include in our answer by right-clicking the component, and then selecting the appropriate configuration pass. This action adds the selected component to our answer file in the specified configuration pass, or phase, of the Windows installation.

It is important that we expand the component list in the Windows Image pane until we see the lowest child node that is the component we wish to add to our answer file.

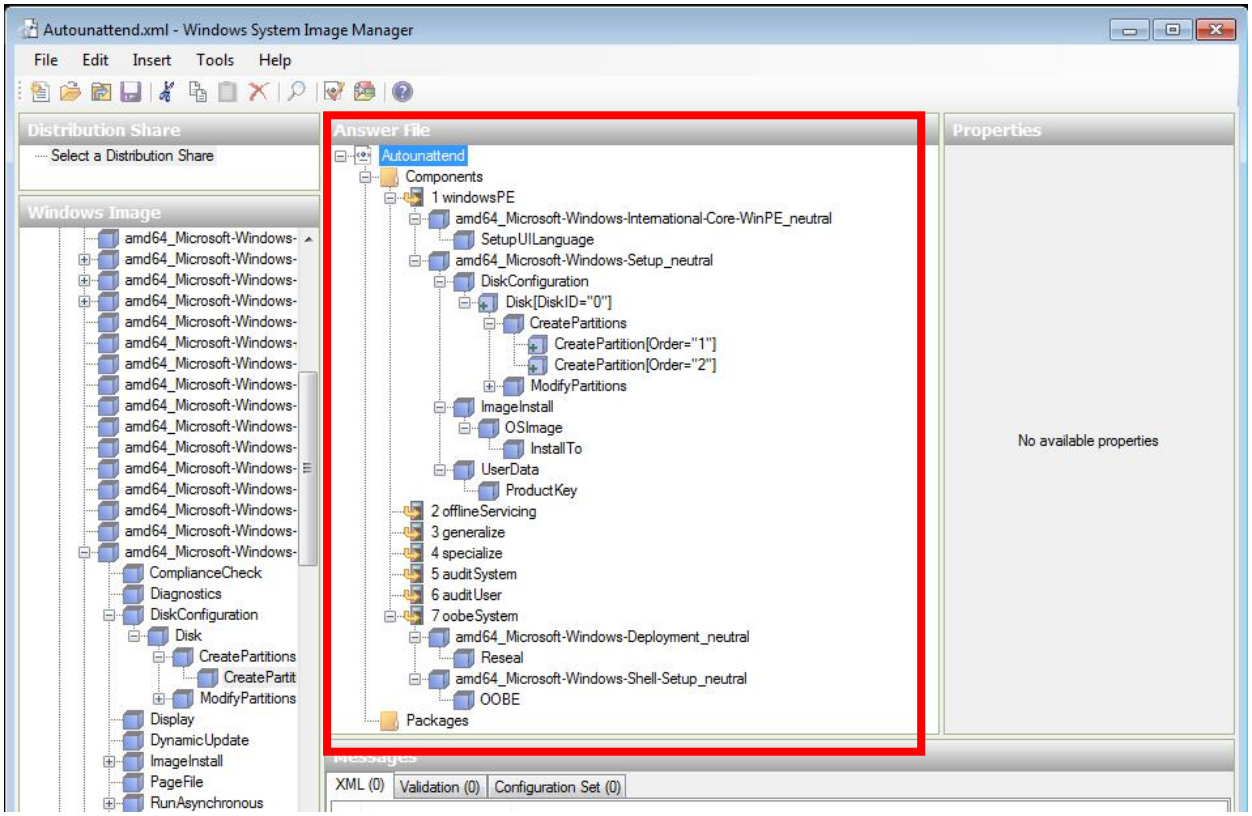
For example, as shown in the screenshot below, we expand Microsoft-Windows-Setup to see the DiskConfiguration node, which we expand to see the disk node, which we expand to see the create partition node, which is expanded to see the lowest child node that is the create partition node that we wish to add to our answer file. When we right click on this node we are given the option to add this component to Pass 1 windows PE (pre-installation environment). This shortcut adds the create partition setting and all parent settings to our answer file in one step.



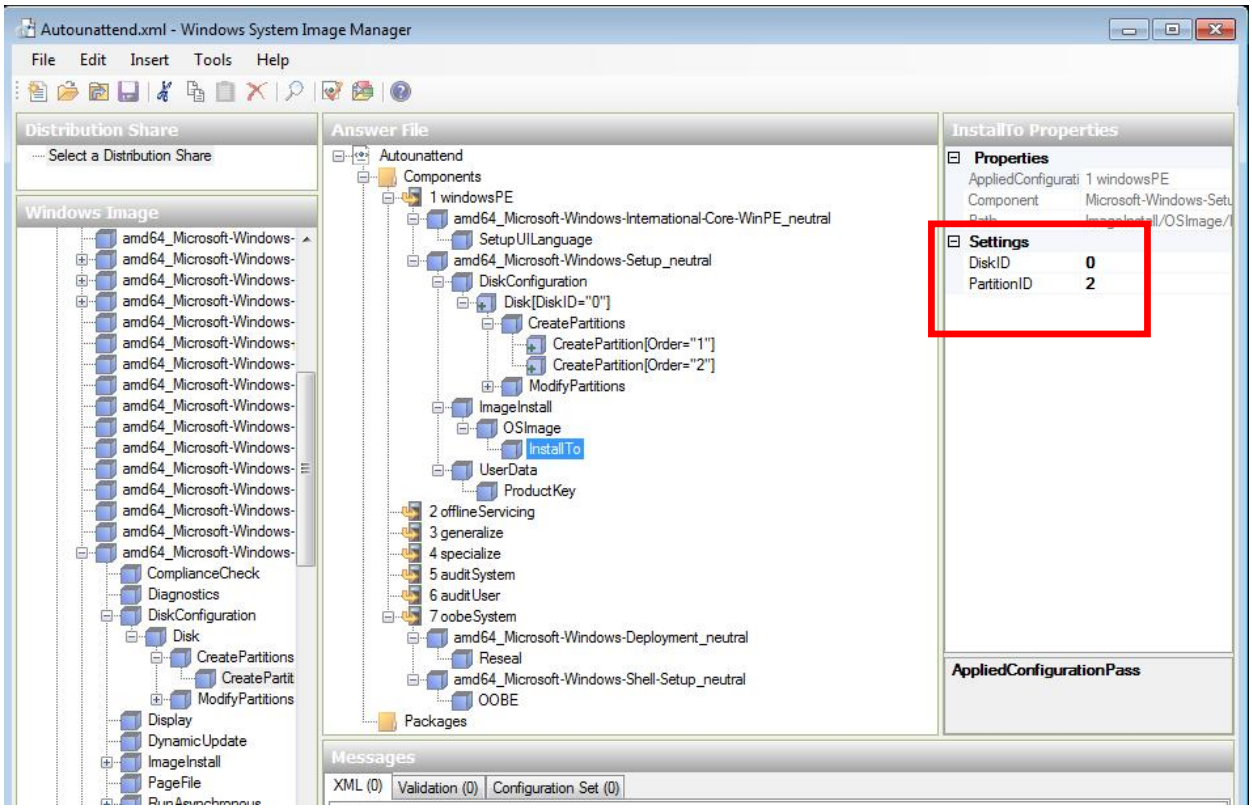
Following the step by step instructions provided by Microsoft we add the components in the table below, this manual describes the creation of a two-partition configuration, therefore two create partition components and two modify partition components are added to the windowsPE configuration pass:

Component	Configuration Pass
Microsoft-Windows-Deployment\Reseal	oobeSystem
Microsoft-Windows-International-Core-WinPE\SetupUILanguage	windowsPE
Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	windowsPE
Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	windowsPE
Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	windowsPE
Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	windowsPE
Microsoft-Windows-Setup\ImageInstall\OSImage\InstallTo	windowsPE
Microsoft-Windows-Setup\UserData	windowsPE
Microsoft-Windows-Shell-Setup\OOBE	oobeSystem

All of the settings we added will now be present in the Windows SIM Answer File pane, as shown below.



When we click on any lowest child node of a component the properties and settings for that node are displayed in the right-hand properties pane, and it is in the settings variables that enter specific values as listed in the table below:

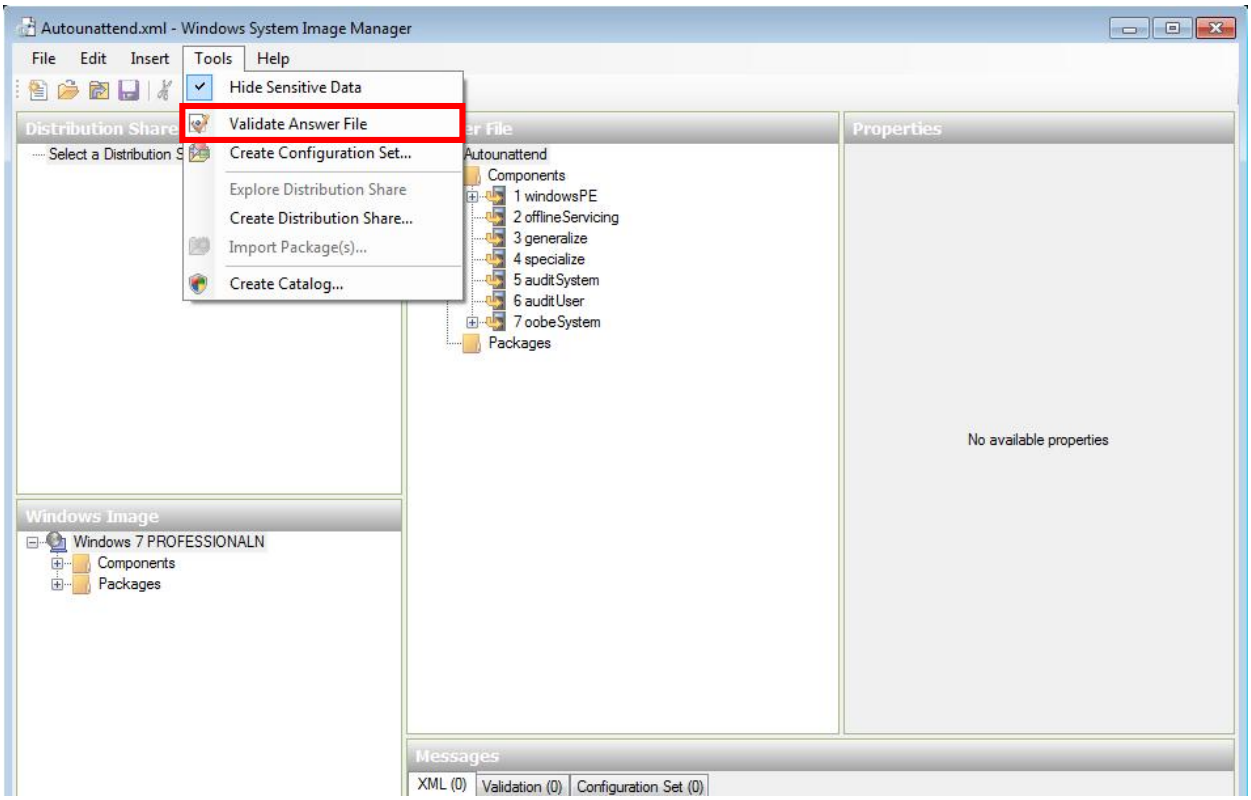


Configuration Pass	Component	Value
1 WindowsPE	Microsoft-Windows-International-Core-WinPE	`InputLocale` = <*Input Locale*>For example, en-US `SystemLocale` = <*System Locale*>For example, en-US `UILanguage` = <*UI Language*> For example, en-US `UserLocale` = <*User Locale*> For example, en-US
1 WindowsPE	Microsoft-Windows-International-Core-WinPE\SetupUILanguage	`UILanguage` = <*UI Language*> For example, en-US
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration	`WillShowUI` = **OnError**
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk	`DiskID` = **0** `WillWipeDisk` = **true**
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	`Order` = **1** `Size` = **300** `Type` = **Primary**
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	`Extend` = **true** `Order` = **2** `Type` = **Primary**
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	`Active` = **true** `Format` = **NTFS** `Label` = **System** `Order` = **1** `PartitionID` = **1**
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	`Format` = **NTFS** `Label` = **Windows** `Order` = **2** `PartitionID` = **2**
1 WindowsPE	Microsoft-Windows-Setup\ImageInstall\OSImage	`InstallToAvailablePartition`= **false** `WillShowUI` = **OnError**
1 WindowsPE	Microsoft-Windows-Setup\ImageInstall\OSIma	`DiskID` = **0** `PartitionID` = **2**

	ge\InstallTo	
1 WindowsPE	Microsoft-Windows-Setup\UserData	`AcceptEula` = **true**
1 WindowsPE	Microsoft-Windows-Setup\UserData\ProductKey	`Key` = *<product key>* `WillShowUI` = **OnError**
7 oobeSystem	Microsoft-Windows-Deployment\Reseal	`ForceShutdownNow` = **false** `Mode` = **Audit**
7 oobeSystem	Microsoft-Windows-Shell-Setup\OOBE	`HideEULAPage` = **true** `ProtectYourPC` = **3**

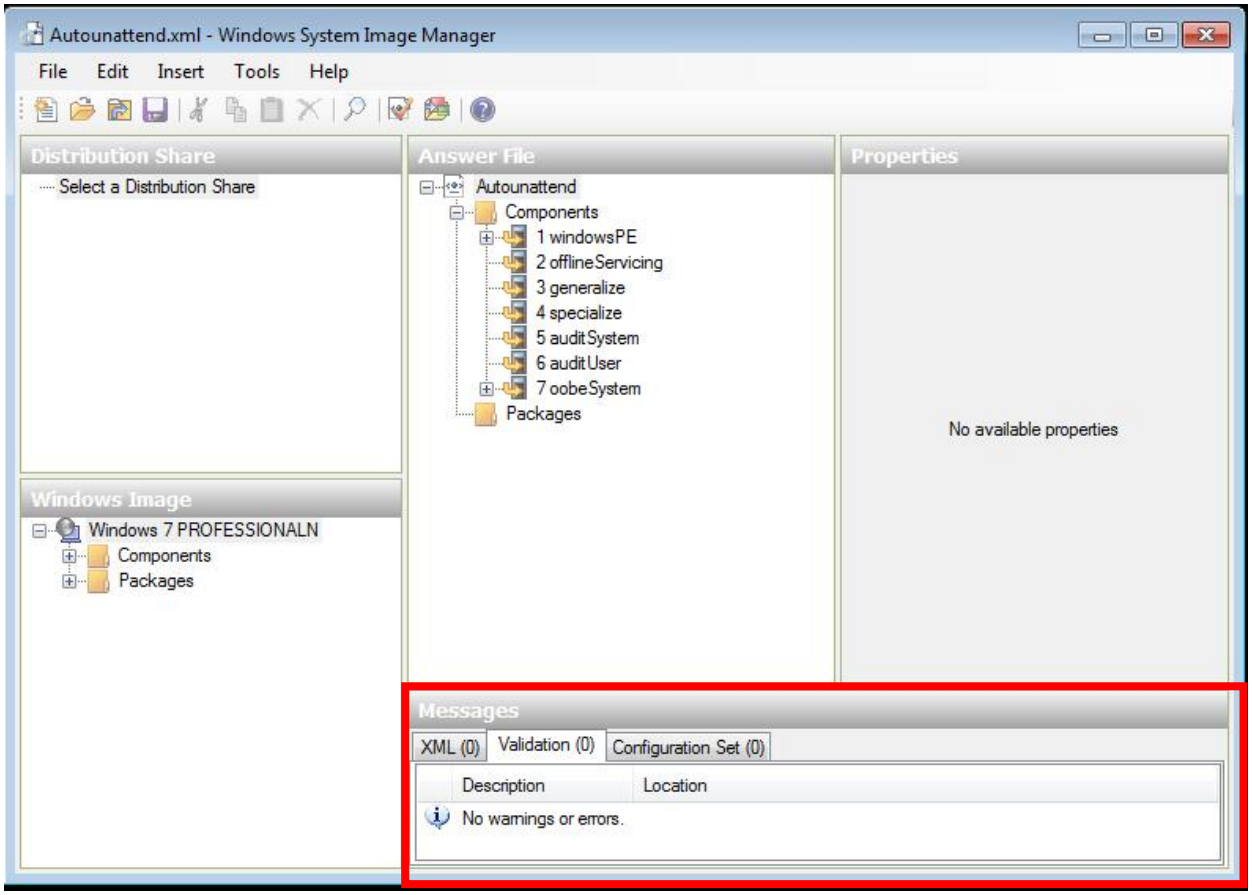
The above settings define a basic unattended installation in which no user input is required during Windows Setup and the final step in building an answer file is to validate the settings therein and save them to a file.

In Windows SIM, we click Tools, and then click Validate Answer File.



The setting values in our answer file are compared with the available settings in the Windows image.

If the answer file validates successfully, a "No warnings or errors" message is generated in the Messages pane at the bottom of the Windows SIM window. Otherwise, error messages will appear in the Messages pane.



If an error occurs, we can double-click the error message in the Messages pane to navigate to the incorrect setting and change the setting to fix the error, and then validate again by clicking Validate Answer File. This step is repeated until the answer file validates.

We then navigate to the File menu, click Save Answer File, and save the answer file as Autounattend.xml.

Finally we copy the Autounattend.xml file to the root directory of a USB flash drive.

We now have a basic answer file that automates a basic unattended installation in which no user input is required during Windows Setup.

2.3.3 Step 3 - Building a Reference Installation

We will now prepare our reference computer to have a customized installation of Windows that can be duplicated onto one or more destination computers. We do this by using the DVD where we have saved our Windows 7 .iso file and the answer file that we created in step 1 above.

We turn on the reference computer and insert the Windows 7 DVD and the USB flash drive containing our answer file named Autounattend.xml.

We then restart the technician computer by pressing the CTRL+ALT+DEL keys. To boot from the CD/DVD-ROM disc, we override the boot order by pressing the appropriate function key during initial boot, and setting boot from CD/DVD as the initial boot location.

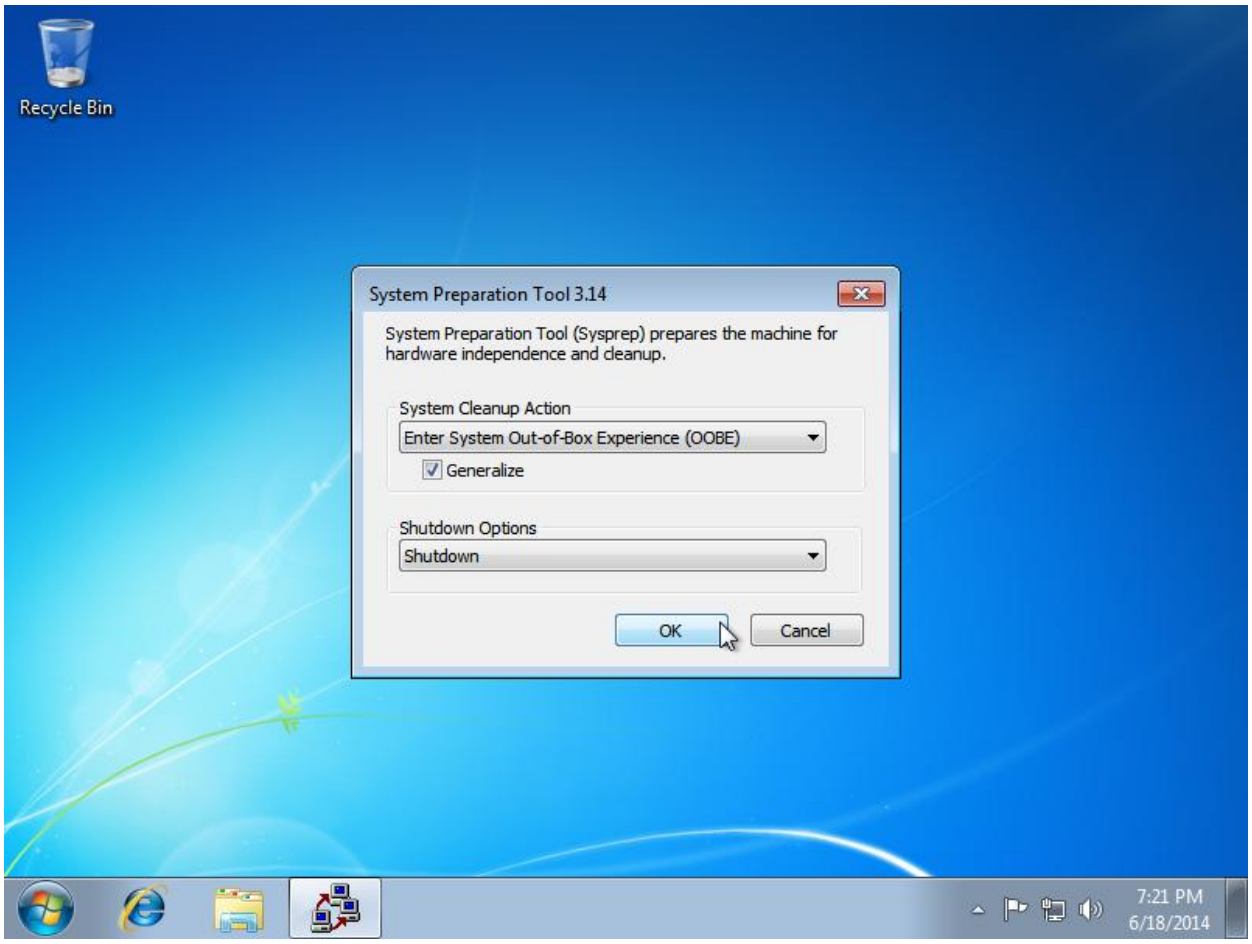
Windows 7 Setup (Setup.exe) will now begin automatically. By default, Windows Setup will search the root directory of all removable media for an answer file called Autounattend.xml, however as VMWare Workstation doesn't recognise USB drives at boot time, it is necessary to press shift+F10 to open a command prompt, from where we enter setup.exe/unattend:<thePathToOurUSBDrive> after which Setup will continue, using the configuration settings from our answer file.

When our installation using the answer file is complete, the computer will reboot to audit mode. Audit mode is the stage of Windows Setup that enables a user to quickly boot to the desktop, install additional applications and device drivers, and test the installation.

We next use the sysprep command with the /generalize option to remove hardware-specific information from the Windows installation, and the /oobe option to configure the computer to boot to Windows Welcome upon the next restart, so that the computer is prepared for the end user.

Windows Welcome does not run in audit mode, but it will run the next time the computer restarts, once we have run the sysprep command with the /oobe option. Windows Welcome, also known as Machine OOBE (out-of-box experience), prompts the end user to read the Microsoft Software License Terms and to configure the computer.

The System Preparation Tool (Sysprep) window is automatically displayed on the desktop in audit mode, and on this window we select Enter System Out Of Box Experience (OOBE) from the System Cleanup Action list, tick Generalize, select Shutdown from the Shutdown Options list and then click OK.



Sysprep.exe prepares the image for capture by cleaning up various user- and computer-specific settings, as well as log files. The reference installation now is complete and ready to be imaged.

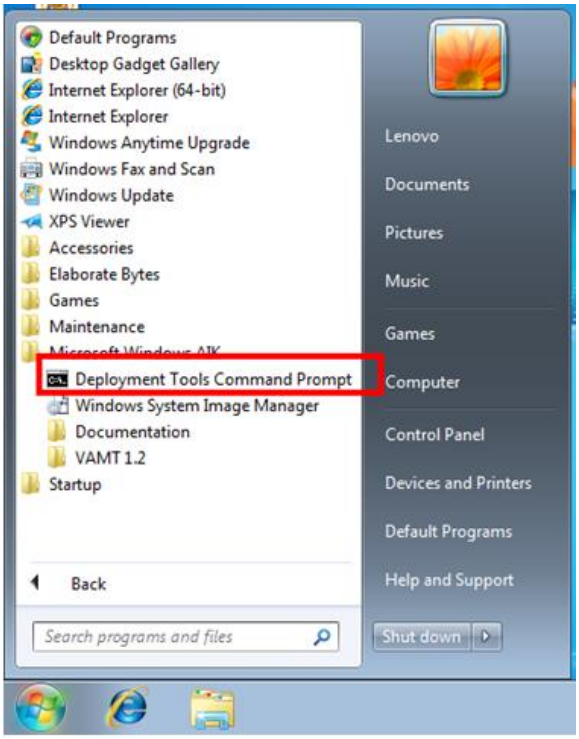
2.3.4 Step 4 - Creating Bootable Windows PE Media

Our next step is to create a bootable Windows PE (Preinstallation Environment) RAM disk on a CD-ROM disc by using the Copype.cmd script.

Windows PE RAM enables us to start a computer for the purposes of deployment and recovery by booting directly into memory, enabling us to remove the Windows PE media after the computer boots.

In step 5 hereunder, we will boot into Windows PE, and use the ImageX tool to capture, modify, and apply file-based disk images.

On the technician computer, we click Start, All Programs, Windows AIK, where we right-click Deployment Tools Command Prompt, and then select Run as administrator.

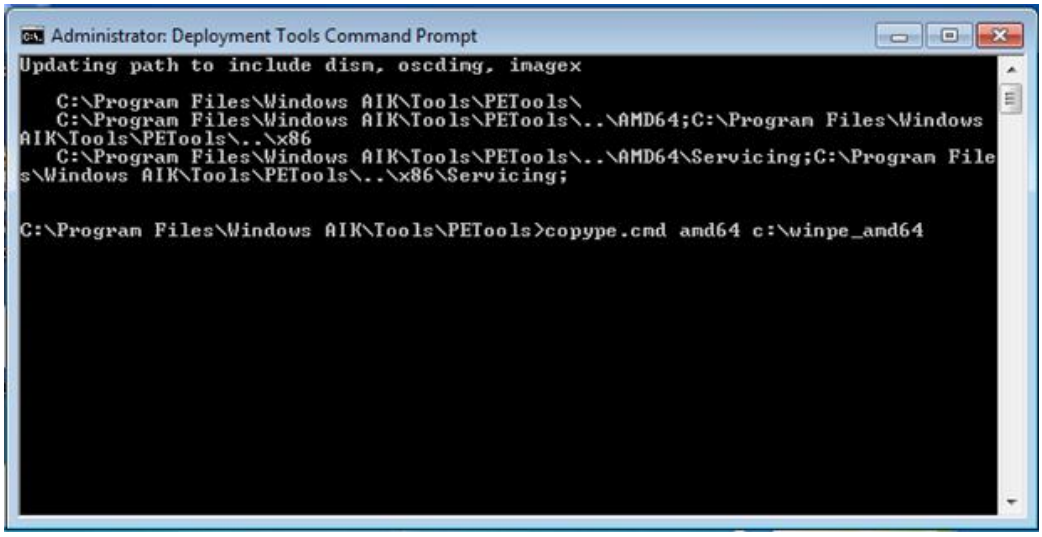


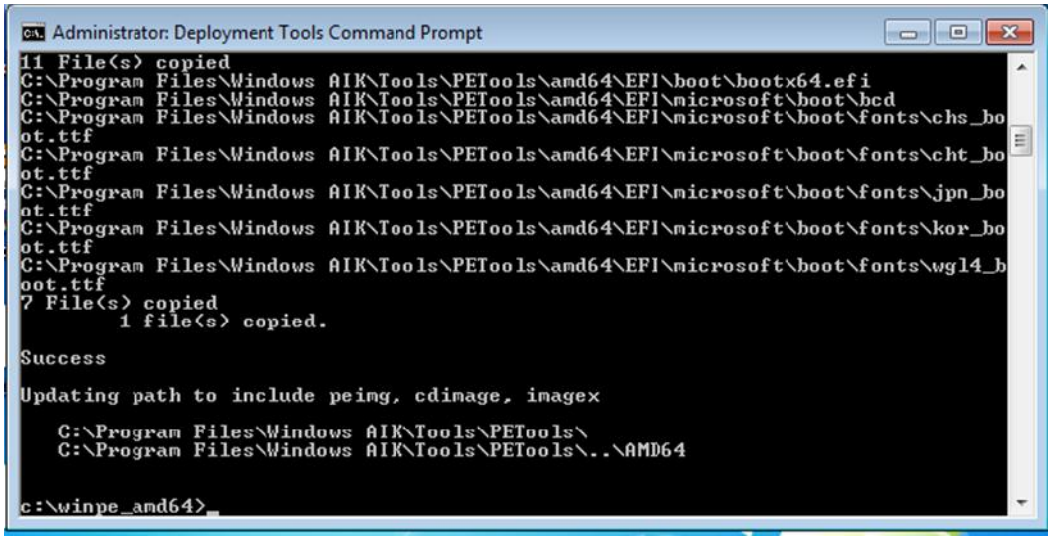
The menu shortcut opens a Command Prompt window and automatically sets environment variables to point to all the necessary tools. By default, all tools are installed at C:\Program Files\Windows AIK\Tools.

At the command prompt, we run the Copype.cmd script:
`copype.cmd <architecture> <destination>` where `<architecture>` can be x86, amd64, or ia64 and `<destination>` is a path to a local directory.

In our case we use `copype.cmd amd64 c:\winpe_amd64`

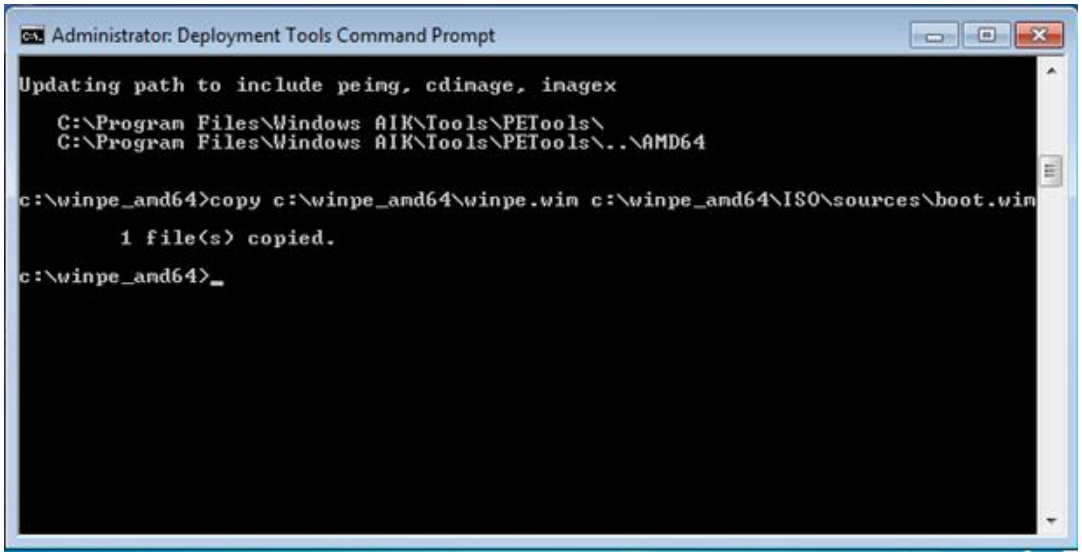
This creates the necessary directory structure and copies all the necessary files for that architecture, i.e. \winpe_amd64\winpe_amd64\ISO\winpe_amd64\mount


Administrator: Deployment Tools Command Prompt
Updating path to include dism, oscdimg, imagex
C:\Program Files\Windows AIK\Tools\PETools\
C:\Program Files\Windows AIK\Tools\PETools\..\AMD64;C:\Program Files\Windows AIK\Tools\PETools\..\x86
C:\Program Files\Windows AIK\Tools\PETools\..\AMD64\Servicing;C:\Program Files\Windows AIK\Tools\PETools\..\x86\Servicing;
C:\Program Files\Windows AIK\Tools\PETools>copype.cmd amd64 c:\winpe_amd64



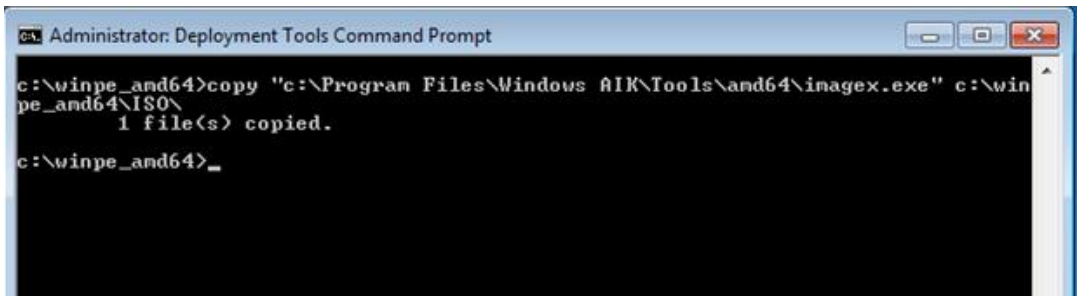
Our next step is to copy the base image named Winpe.wim to the \Winpe_x86\ISO\sources folder and rename the file to Boot.wim, by using the following script:

```
copy c:\winpe_amd64\winpe.wim c:\winpe_amd64\ISO\sources\boot.wim
```



We then Copy ImageX into \Winpe_amd64\ISO by typing:

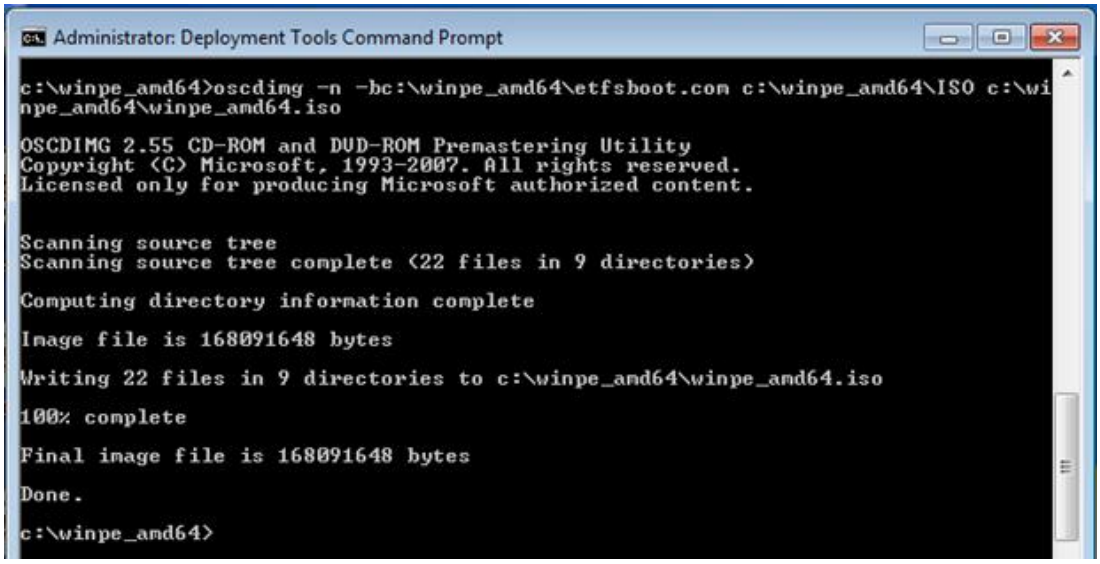
```
copy "c:\program files\Windows AIK\Tools\amd64\imagex.exe" c:\winpe_amd64\iso\
```



Following this, we then create a Windows PE image (.iso) file. This is done by using the Oscdimg tool from the Deployment Tools Command Prompt, typing:

```
oscdimg -n -bc:\winpe_amd64\etfsboot.com c:\winpe_amd64\ISO
c:\winpe_amd64\winpe_amd64.iso
```

as shown in the screenshot below:


Administrator: Deployment Tools Command Prompt
c:\winpe_amd64>oscdimg -n -bc:\winpe_amd64\etfsboot.com c:\winpe_amd64\ISO c:\winpe_amd64\winpe_amd64.iso
OSCDIMG 2.55 CD-ROM and DVD-ROM Premastering Utility
Copyright (C) Microsoft, 1993-2007. All rights reserved.
Licensed only for producing Microsoft authorized content.
Scanning source tree
Scanning source tree complete (22 files in 9 directories)
Computing directory information complete
Image file is 168091648 bytes
Writing 22 files in 9 directories to c:\winpe_amd64\winpe_amd64.iso
100% complete
Final image file is 168091648 bytes
Done.
c:\winpe_amd64>

Finally, we burn the image (Winpe_x86.iso) to a CD-ROM disc, and we now have a bootable Windows PE RAM CD containing the ImageX tool.

2.3.5 Step 5 - Capturing the Installation onto a Network Share

The penultimate step is to capture an image of our reference computer by using Windows PE and the ImageX tool.

We will then store that image on a network share.

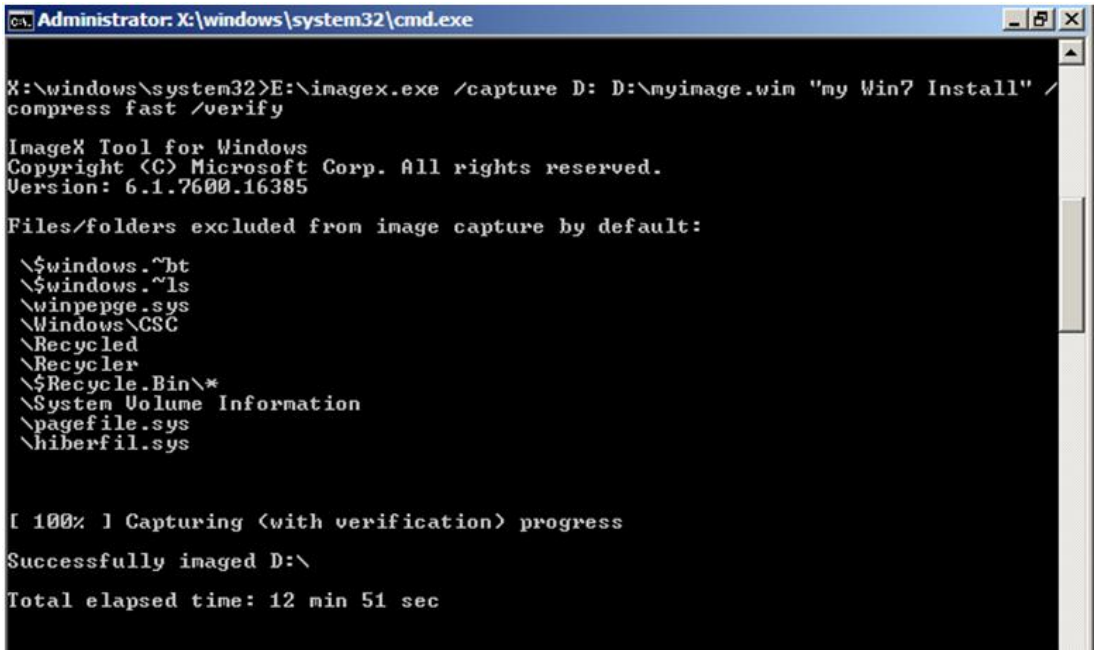
On the reference computer, we insert our Windows PE CD-ROM disc and restart the computer.

As previously described, to boot from the CD/DVD-ROM disc, we override the boot order by pressing the appropriate function key during initial boot, and setting boot from CD/DVD as the initial boot location.

Windows then PE starts, and launches a Command Prompt window.

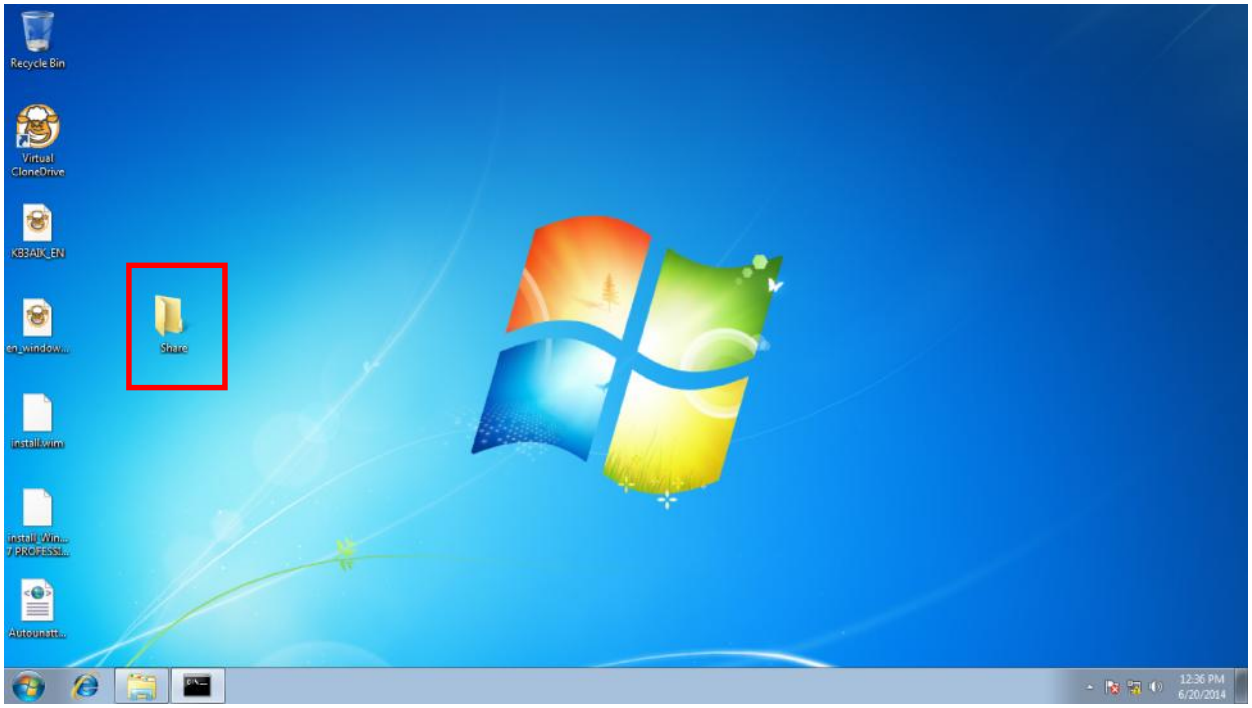
We then capture an image of the reference installation by using the ImageX tool located on our Windows PE CD/DVD ROM by typing:

```
E:\imagex.exe /capture D: D:\myimage.wim "my Win7 Install" /compress fast /verify
```



Our next step is to copy the image to a network location, this is possible because Windows PE provides network support.

On our technician computer, we create a public folder, set with appropriate permissions, on the desktop called Share.



While Windows PE provides network support, it is important to note that when we boot a computer with WinPE, the pre-installation environment is configured to obtain an IP address automatically, and if we don't have DHCP service on the network, the WinPE computer will obtain an IP address from the Automatic Private IP Address range (APIPA) which is a class B network address.

If we are using Class C network addresses for our technician and reference computer, then, while the reference computer is booted with WinPE, then the two computers are in different subnets, and cannot communicate.

Therefore, on our reference computer, at the command prompt, we type:

```
netsh int ip set address local static 192.168.0.42 255.255.255.0
```

This sets a static IP address to the reference computer in PE mode that is in the same ipv4 address range as our technician computer, facilitating communication between the two.

Following this, we mount the Share folder as a drive on the reference computer, at the command prompt, we type

```
net use N: \\<ComputerName>\<PathToSharedFolder> <password> /user:<userName>
```

in our case this is:

```
net use N: \\WIN-QFC9RD5ACBR\Users\Lenovo\Desktop\Share Pa$$w0rd /user:Lenovo
```

We then change the current drive to the new mounted drive by typing:

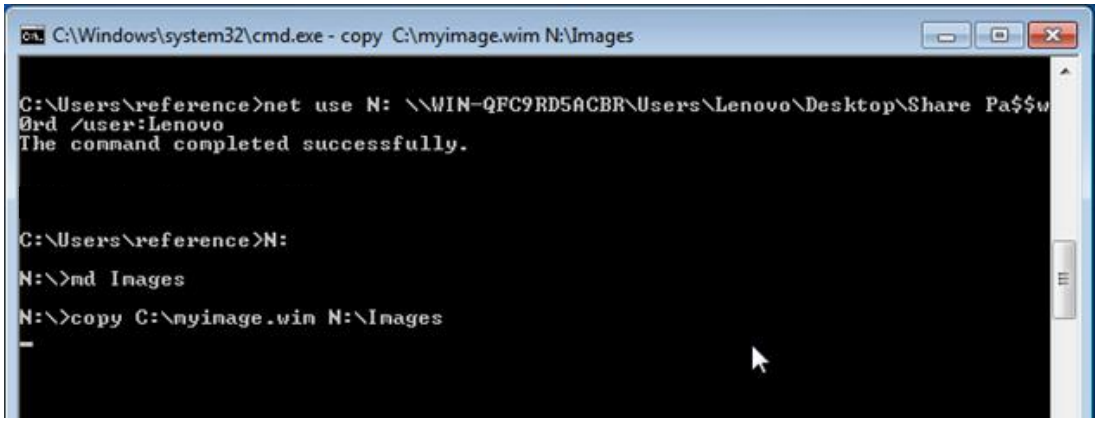
```
N:
```

The next step is to create a new folder called Images within the new drive by typing:

```
md Images
```

Finally, we copy the captured image to our newly created folder by typing:

```
copy C:\myimage.wim N:\Images
```



We now have an image of our reference installation, and we can deploy the image onto new hardware.

2.3.6 Step 6 - Deploying from a Network Share

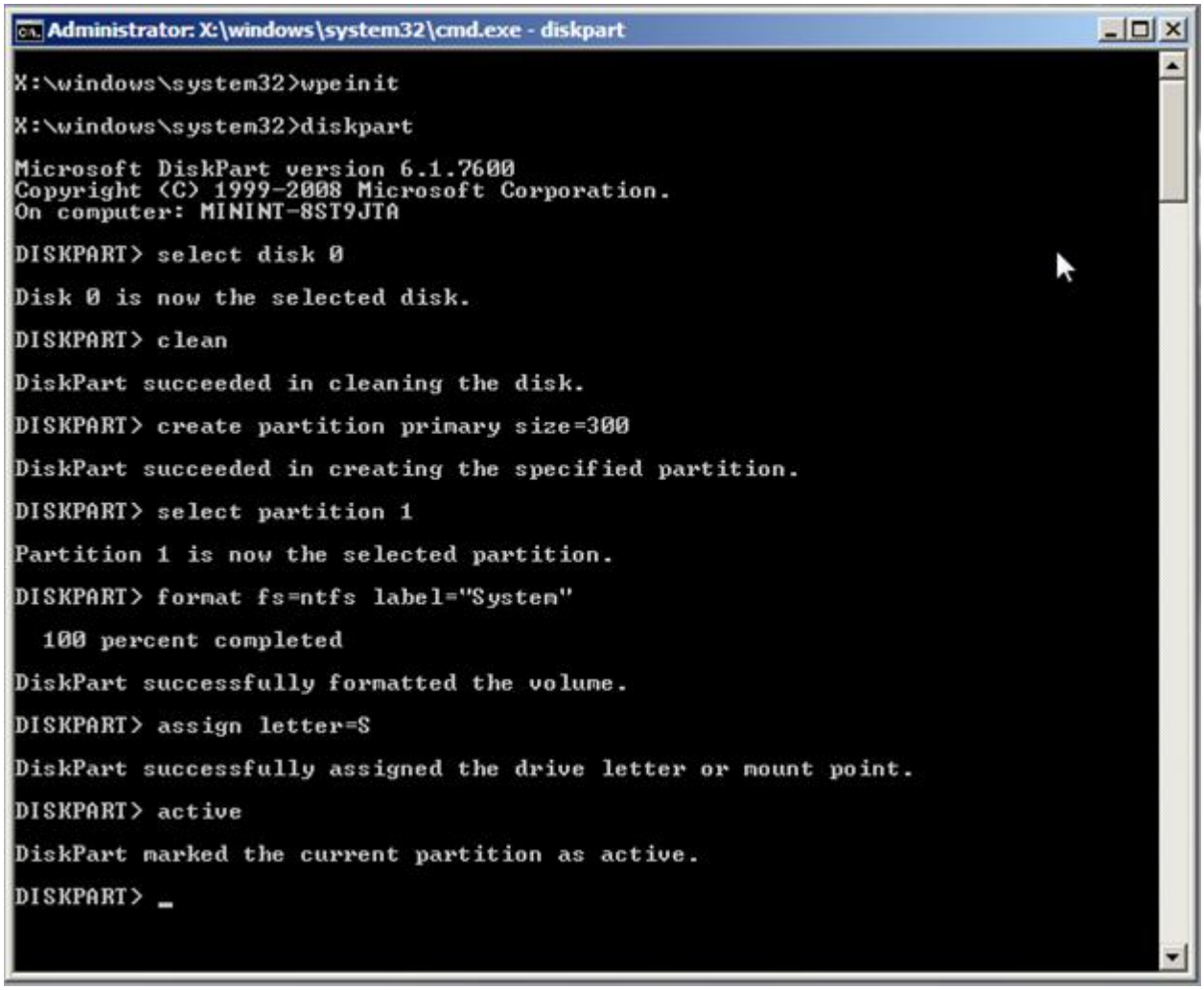
The final step is to use the DiskPart tool to format the hard drive on the reference computer in order for it to act as a destination computer. We can then copy our image from the network share.

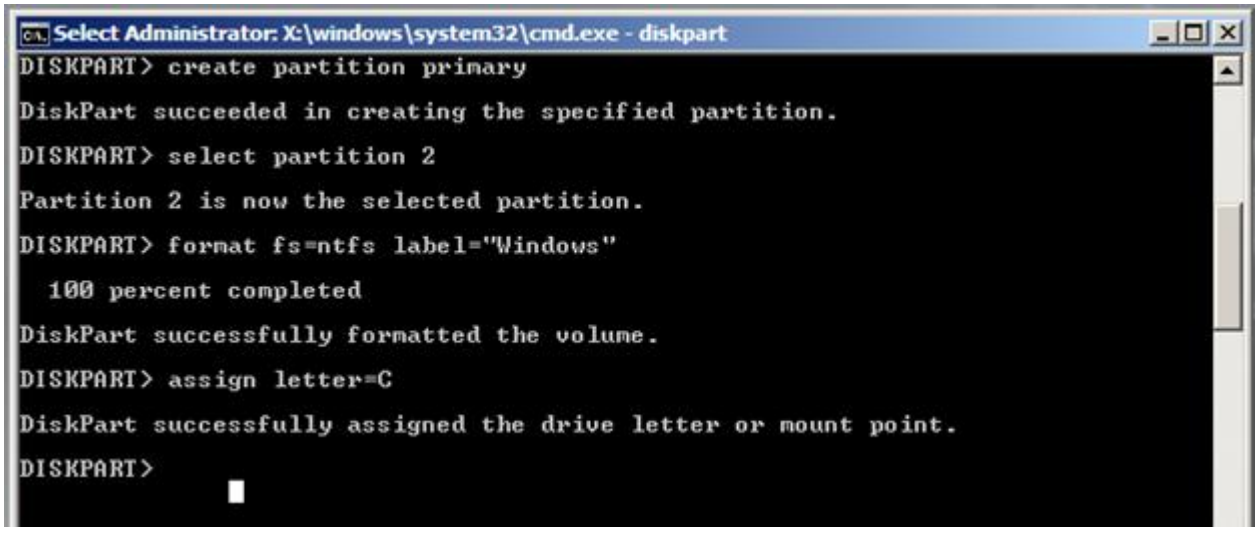
On the reference computer, we insert our Windows PE media and restart the computer by pressing the CTRL+ALT+DEL keys.

The reference computer hard drive contains an active partition. Therefore we must override the boot order to boot from the CD/DVD-ROM drive. During initial boot, we select the appropriate function key to override the boot order, and Windows PE starts, and launches a Command Prompt window.

We then format the hard drive to reflect the disk configuration requirements by using the DiskPart tool from the Windows PE Command Prompt window. In our case, we type:

```
diskpart
select disk 0
clean
create partition primary size=300
select partition 1
format fs=ntfs label="System"
assign letter=S
active
create partition primary
select partition 2
format fs=ntfs label="Windows"
assign letter=C
exit
```


Administrator: X:\windows\system32\cmd.exe - diskpart
X:\windows\system32>wpeinit
X:\windows\system32>diskpart
Microsoft DiskPart version 6.1.7600
Copyright (C) 1999-2008 Microsoft Corporation.
On computer: MININT-8ST9JTA
DISKPART> select disk 0
Disk 0 is now the selected disk.
DISKPART> clean
DiskPart succeeded in cleaning the disk.
DISKPART> create partition primary size=300
DiskPart succeeded in creating the specified partition.
DISKPART> select partition 1
Partition 1 is now the selected partition.
DISKPART> format fs=ntfs label="System"
100 percent completed
DiskPart successfully formatted the volume.
DISKPART> assign letter=S
DiskPart successfully assigned the drive letter or mount point.
DISKPART> active
DiskPart marked the current partition as active.
DISKPART> _


Select Administrator: X:\windows\system32\cmd.exe - diskpart
DISKPART> create partition primary
DiskPart succeeded in creating the specified partition.
DISKPART> select partition 2
Partition 2 is now the selected partition.
DISKPART> format fs=ntfs label="Windows"
100 percent completed
DiskPart successfully formatted the volume.
DISKPART> assign letter=C
DiskPart successfully assigned the drive letter or mount point.
DISKPART>

We can then copy the image from the network share to our local hard drive.

As described above, we mount the Share folder as a drive on the destination computer, at the command prompt, we type

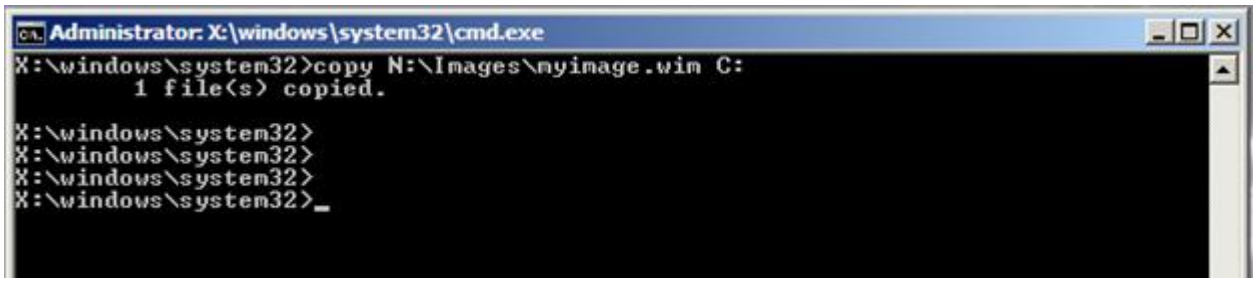
```
net use N: \\<ComputerName>\<PathToSharedFolder> <password> /user:<userName>
```

in our case this is:

```
net use N: \\WIN-QFC9RD5ACBR\Users\Lenovo\Desktop\Share Pa$$w0rd /user:Lenovo
```

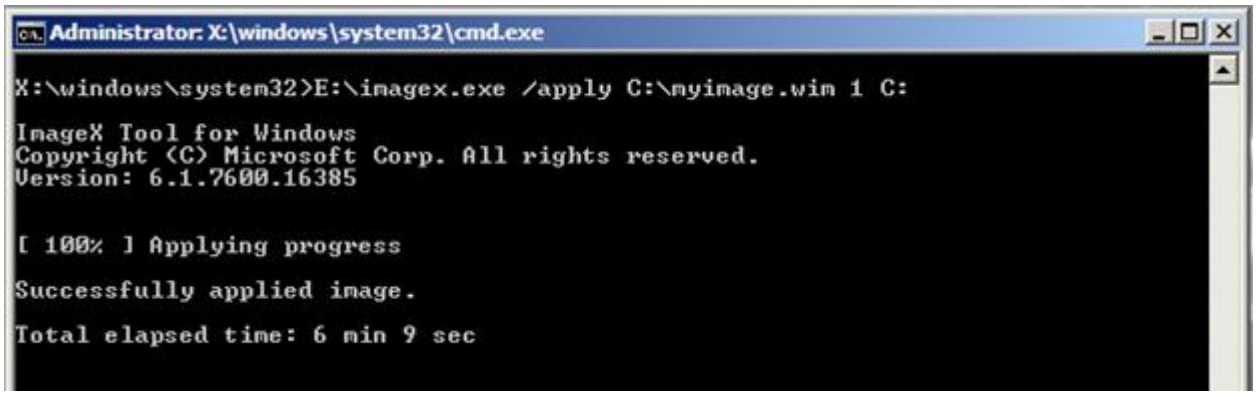
We then copy the image from the Share folder on the technician computer to the hard drive of the destination computer by typing:

```
copy N:\Images\myimage.wim C:
```



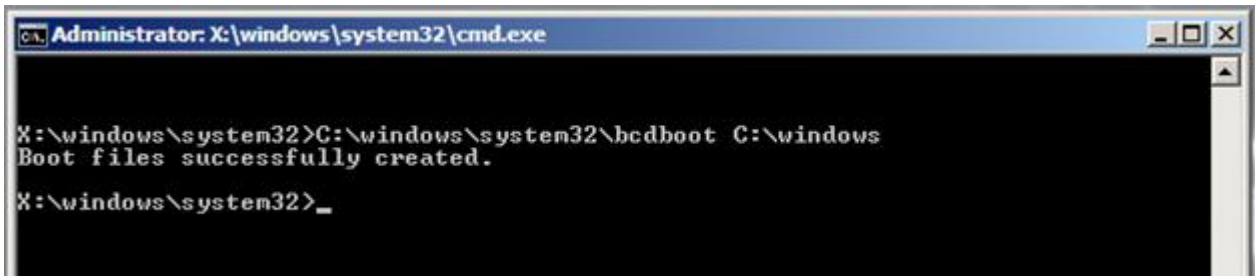
Following this we apply the image to the hard drive by using the ImageX tool located on our Windows PE media by typing:

```
E:\imagex.exe /apply C:\myimage.wim 1 C:
```


Administrator: X:\windows\system32\cmd.exe
X:\windows\system32>E:\imagex.exe /apply C:\myimage.wim 1 C:
ImageX Tool for Windows
Copyright (C) Microsoft Corp. All rights reserved.
Version: 6.1.7600.16385
[100%] Applying progress
Successfully applied image.
Total elapsed time: 6 min 9 sec

Finally, we use BCDboot to initialize the Boot Configuration Data (BCD) store and copy boot environment files to the system partition. We effect this by typing:

```
C:\windows\system32\bcdboot C:\windows
```



Success! Our custom image is now deployed onto the destination computer, and it is ready for use.

3. Part A - Task A2

Microsoft Windows offers the ability to enforce full drive encryption, using a Virtual Machine Document the process of Implementing Bitlocker in the form of a user instruction manual. During the process outline any options and or requirements which must be met in order to setup same.

3.1 Preamble

Windows BitLocker Drive Encryption is a security feature that provides data protection for a computer, by encrypting all data stored on the Windows operating system volume. We define a volume as consisting of one or more partitions on one or more hard disks. BitLocker works with simple volumes, where one volume is one partition.

For best security BitLocker uses a Trusted Platform Module (TPM) to help protect the Windows operating system and user data, and helps to ensure that a computer, if lost or stolen, or even left unattended, cannot be tampered with.

A Trusted Platform Module (TPM) is a microchip that is built into a computer and used to store cryptographic information, such as encryption keys. Information stored on the TPM is generally more secure from external software attacks and physical theft.

BitLocker can also be used without a TPM by changing the default behavior of the BitLocker setup wizard using Group Policy. When BitLocker is used without a TPM, the required encryption keys are stored on a USB flash drive that must be presented to unlock the data stored on a volume.

3.1.1 How BitLocker Drive Encryption Works

BitLocker Drive Encryption protects data by encrypting the entire Windows operating system volume.

If the computer is equipped with a compatible TPM, BitLocker uses the TPM to lock the encryption keys that protect the data. This means that the keys cannot be accessed until the TPM has verified the state of the computer. The encryption of the entire volume protects all of the data, including the operating system itself, as well as the Windows registry. As the keys needed to decrypt data remain locked by the TPM, the data cannot be read just by removing the hard disk and installing it in another computer.

During startup, the TPM does not release the key that unlocks the encrypted partition until it has compared a hash of important operating system configuration values with a snapshot taken earlier, thus verifying the integrity of the Windows startup process. If the TPM detects that the Windows installation has been tampered with then the key is not released.

It is possible to further increase security by combining the use of a TPM with either a PIN entered by the user or a startup key stored on a USB flash drive.

Where a TPM is not available, BitLocker can provide encryption, without the added security of locking keys with the TPM, by the the user createing a startup key that is stored on a USB flash drive.

3.1.2 TPM Definition

A TPM is a microchip that is designed to provide basic security-related functions, primarily involving encryption keys. It is usually installed on the motherboard of a computer, and communicates with the rest of the system by means of a hardware bus.

The facility of a TPM allows computers to create cryptographic keys and encrypt them so that they can be decrypted only by the TPM. This process, known as wrapping or binding a key, helps to protect the key from disclosure. Each TPM has a unique master wrapping key, the Storage Root Key (SRK), which is stored within the TPM itself and the private portion of a key created in a TPM is never exposed.

Computers with a TPM can also create a key that as well as being wrapped, is also tied to specific hardware or software conditions and this is known as sealing a key. When a sealed key is first created, the TPM records a snapshot of configuration values and file hashes. A sealed key is only unsealed or released when those current system values match the ones in the snapshot. BitLocker uses these sealed keys to detect attacks against the integrity of the Windows operating system.

With a TPM, private portions of key pairs are kept separated from the memory controlled by the operating system. Using its own internal firmware and logic circuits for processing instructions, the TPM does not rely upon the operating system and is not exposed to external software vulnerabilities.

3.2 System Requirements

3.2.1 Windows Versions

The following versions of windows include BitLocker functionality:

- Windows 8.1 Professional Edition
- Windows 8.1 Enterprise Edition
- Windows Server 2012
- Windows Server 2008 R2
- Windows Server 2008
- Windows 7 Enterprise Edition
- Windows 7 Ultimate Edition
- Windows Vista Enterprise Edition
- Windows Vista Ultimate Edition

3.2.2 System Configuration

In order to enable BitLocker drive encryption, the system must be configured as follows:

- The computer must either have a TPM of version 1.2 or higher, or a removable USB memory device, such as a USB flash drive. If the computer doesn't have TPM version 1.2 or higher, BitLocker will store its key on the flash drive.
- The computer must have at least two partitions. One partition must include the drive Windows is installed on, which is the drive that BitLocker will encrypt. The other partition is the active partition, which must remain unencrypted so that the computer can be started.
- The system must be formatted with the NTFS file system.
- The BIOS must be compatible with TPM and the computer must support USB devices during computer startup.

3.3 Procedure

In an enterprise environment, BitLocker drive encryption would typically be implemented on the system drive of a computer with a TPM chip built onto its motherboard. However, as noted above, it is still possible, though not as secure, to enable BitLocker drive encryption on a computer that does not have a TPM chip, and as the computer being used for the purpose of writing this manual is not equipped with a TPM chip, it is this method that we will describe with the aid of screenshots. However, for the sake of completeness, a description of how to enable BitLocker drive encryption employing a TPM chip will be described first.

3.3.1 BitLocker Drive Encryption on OS drive of computer with TPM

3.3.1.1 Step 1

We click Start, Control Panel, System and Security, and then BitLocker Drive Encryption.

3.3.1.2 Step 2

We then click Turn On BitLocker for the operating system drive. BitLocker will then scan our computer to ensure that it meets BitLocker system requirements. If the computer meets requirements, BitLocker then advises the next steps that need to be taken to turn on BitLocker, such as drive preparation, turning on the TPM, and encrypting the drive.

This description describes the scenario of encrypting a single partition that holds the operating system drive, and BitLocker prepares the drive by shrinking the operating system drive and creating a new system partition to use for system files that are required to start or recover the operating system and that cannot be encrypted. This new drive will not have a drive letter in order to help prevent the storing of data files on this drive inadvertently.

After the drive is prepared, we restart the computer.

3.3.1.3 Step 3

If the TPM is not initialized, the BitLocker setup wizard instructs us to remove any CDs, DVDs, or USB drives from the computer and restart the computer to begin the process of turning on the TPM. We are either prompted to enable the TPM before the operating system boots or in some cases, depending on the BIOS of the computer, it may be necessary to navigate to the BIOS options and enable the TPM manually.

Once we confirm that we want the TPM enabled, the operating system will start and the Initializing the TPM security hardware progress indicator will be displayed.

3.3.1.4 Step 4

After the TPM is initialized, the BitLocker setup wizard prompts us to choose how to store the recovery key, from the following options:

- Save the recovery key to a USB flash drive
- Save the recovery key to a file (i.e. a network drive or other location)
- Print the recovery key

For optimum security, it is advisable to save the recovery key apart from the computer, in our case we select to save it to a USB flash drive and follow the steps on the wizard accordingly.

The recovery key is required if the encrypted drive is moved to another computer or changes are made to the system startup information. This recovery key is essential so best practice is to make additional copies of the key and store them in safe places that can be readily accessed to recover access to the drive.

3.3.1.5 Step 5

We then confirm that we are ready to encrypt the drive, with the Run BitLocker system check check box selected, and then click Continue.

We then agree to restart the computer by clicking Restart now.

The computer restarts, and BitLocker checks if the computer meets BitLocker requirements and is ready for encryption. If it is not, an error message is generated alerting us to the problem after we have logged on.

A common problem that causes the computer to not meet BitLocker requirements is the configuration of the system partition.

BitLocker requires a minimum system partition size of 100 MB, and the Windows Recovery Environment requires 200 MB. When the operating system is installed, the system partition is automatically created by the setup process with a default size of 300 MB.

However, this default partition size can be changed by computer manufacturers or system administrators when they install the operating system.

If the system partition is exactly 100 MB, BitLocker setup assumes that we have a Windows Recovery DVD for use with the computer and the system check is completed without any errors. However, if we have a system partition size between 101 MB and 299 MB, the following error message is generated: "You will no longer be able to use Windows Recovery Environment unless it is manually enabled and moved to the system drive."

If we have a Windows 7 DVD that contains the Windows Recovery Environment or we have another system recovery process in place, we may disregard this message and continue with BitLocker setup.

Otherwise, it is advisable check our system partition and verify that we have at least 200 MB of free space on the system partition so that the Windows Recovery Environment can be retained on the system drive along with the BitLocker Recovery Environment and other files that BitLocker requires to unlock the operating system drive.

If it is ready for encryption, the Encrypting status bar is displayed, which shows the progress of the drive encryption.

Encrypting the drive is time consuming and a completion message is displayed when encryption is finished,

By completing this procedure, we have encrypted the operating system drive and created a recovery key that is unique to this drive.

The next time we log on, there are no apparent changes, however If the TPM ever changes or cannot be accessed, if there are changes to key system files, or if someone tries to start the computer from a disk to circumvent the operating system, the computer will switch to recovery mode and prevent Windows from starting.

3.3.2 BitLocker Drive Encryption on OS drive of computer with no TPM

Hereunder is the step by step guide to enabling BitLocker drive encryption on a computer that does not have a TPM chip available.

As noted above, the implementation of BitLocker requires that our computer supports USB devices during computer startup.

However, we are using a virtual machine by means of VMWare Workstation which does not support booting to USB. USB drives are not available to the Windows bootloader on VMWare Workstation, so it cannot read the keys from a passed-through USB flash drive. BitLocker only

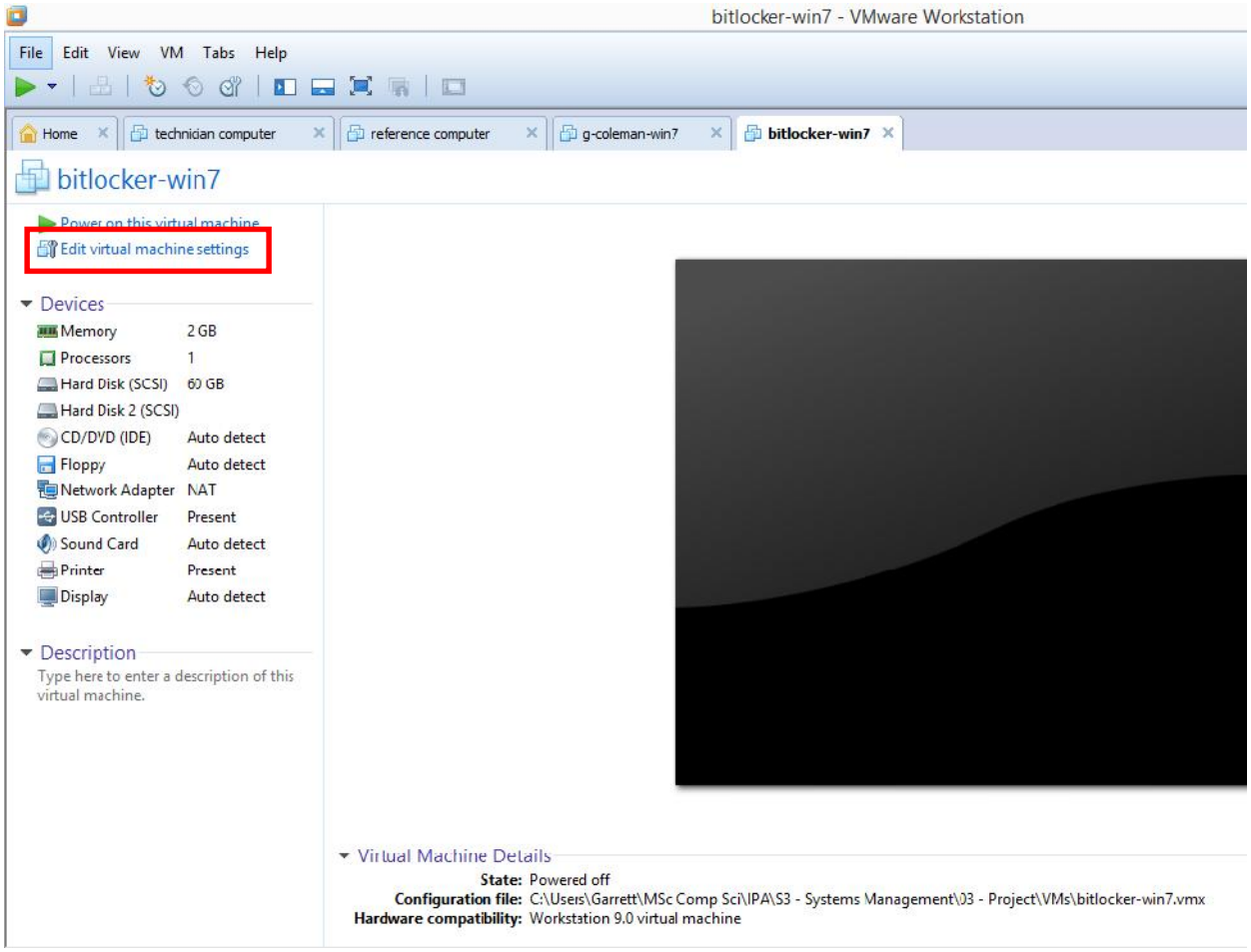
allows us to write the keys to a USB drive, but the BitLocker boot code can read the keys form any device, so our workaround is as per the following five steps:

1. We will create a small virtual hard drive that is stored on a USB key and mounted to our virtual machine.
2. We will change the Group Policy settings in windows to allow BitLocker to work without a TPM.
3. We will mount a temporary USB drive to our Virtual Machine, and once BitLocker is setup on the system drive, we will have BitLocker write the Key and Backup key to the temporary USB.
4. Once BitLocker has written the keys, we will copy them over to the virtual disk, unmount our first USB drive and allow BitLocker to reboot.
5. BitLocker will then start encrypting after it boots back up.

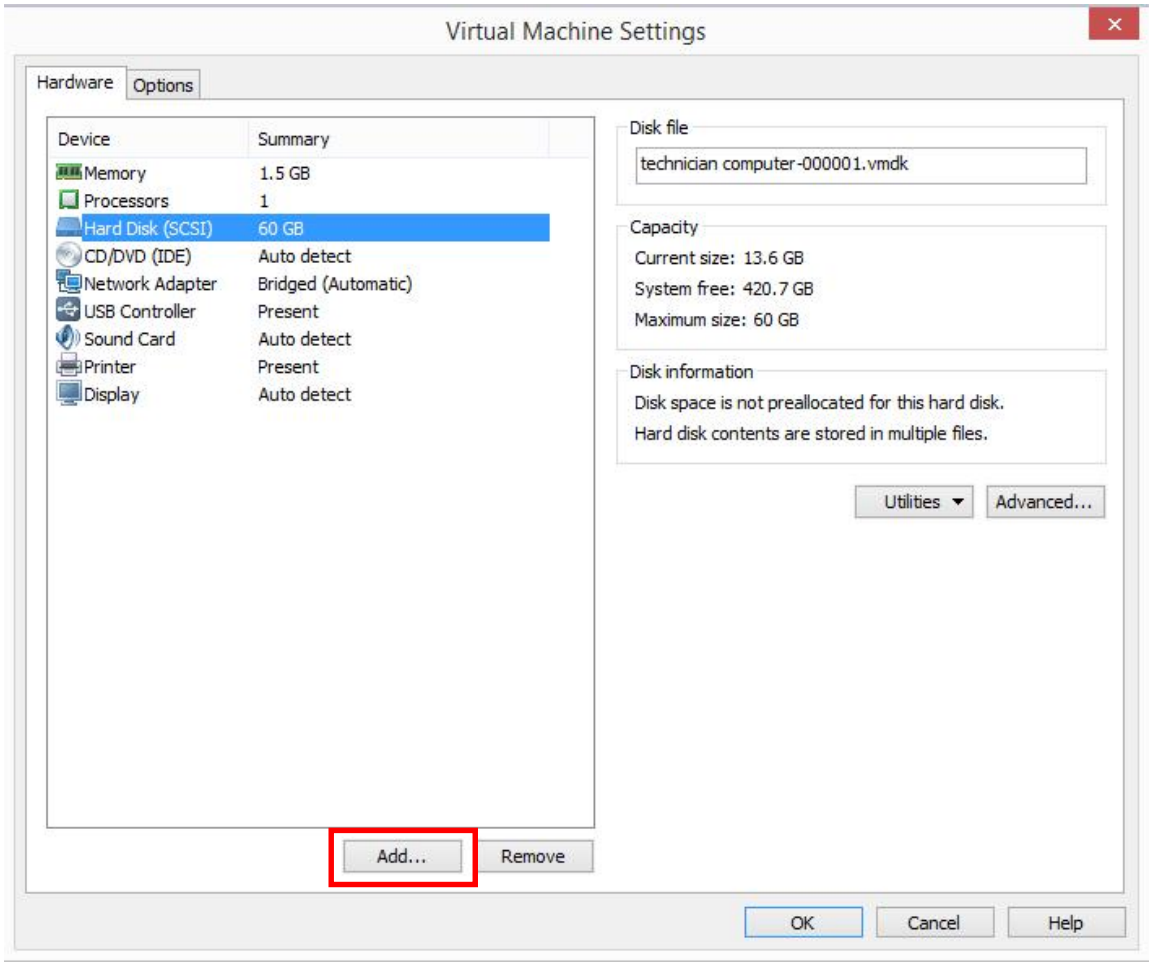
3.3.2.1 Step 1: Create and Mount a Virtual Hard Drive

Our first step is to provide a permanent location for the BitLocker files. We shut down our virtual machine, and follow the steps below to add a new virtual hard disk.

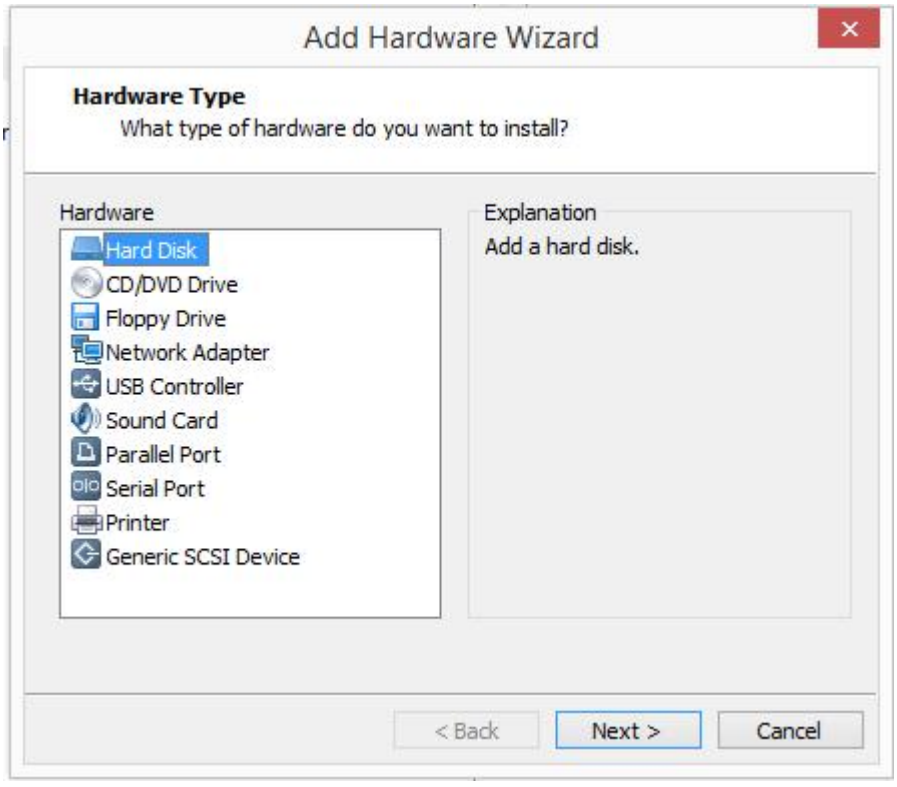
Click 'Edit Virtual Machine Settings'



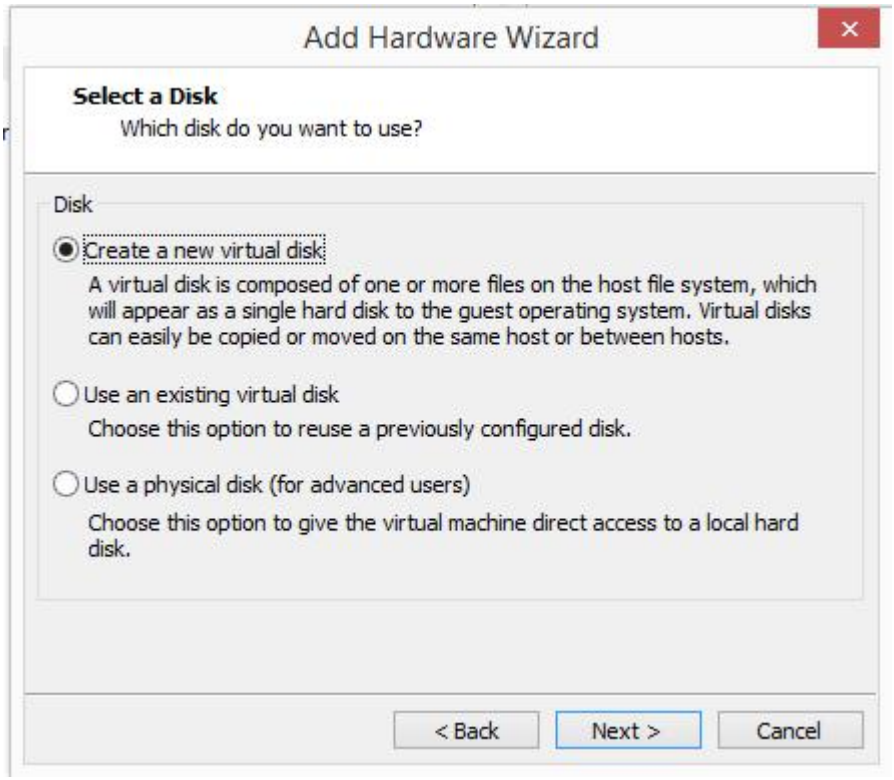
Highlight Hard Disk and click 'Add'



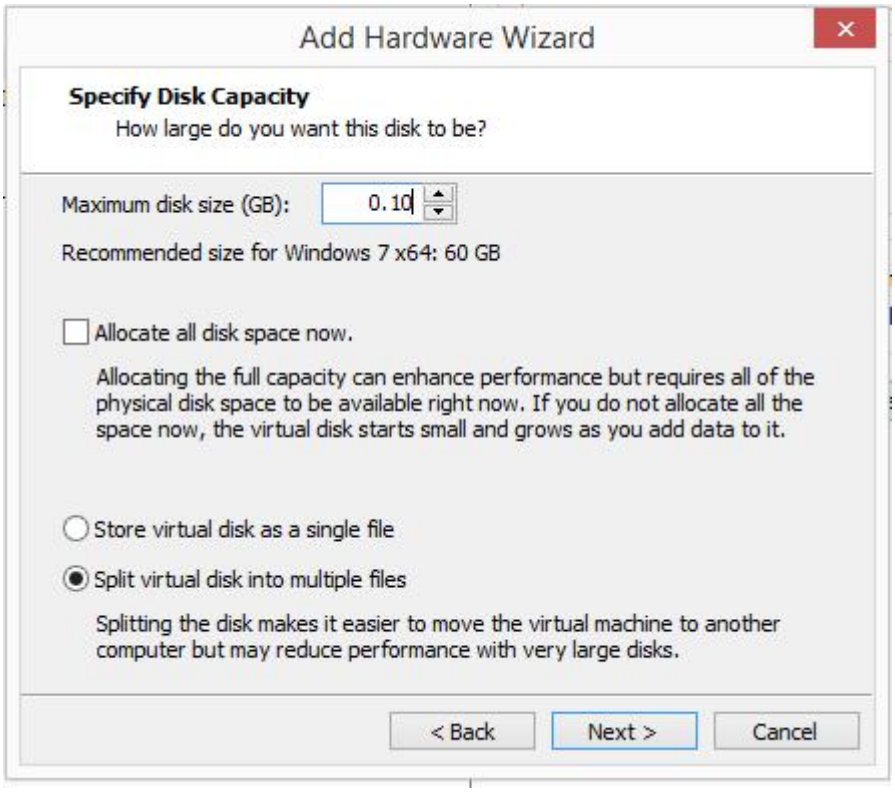
For Hardware Type we select 'Hard Disk'



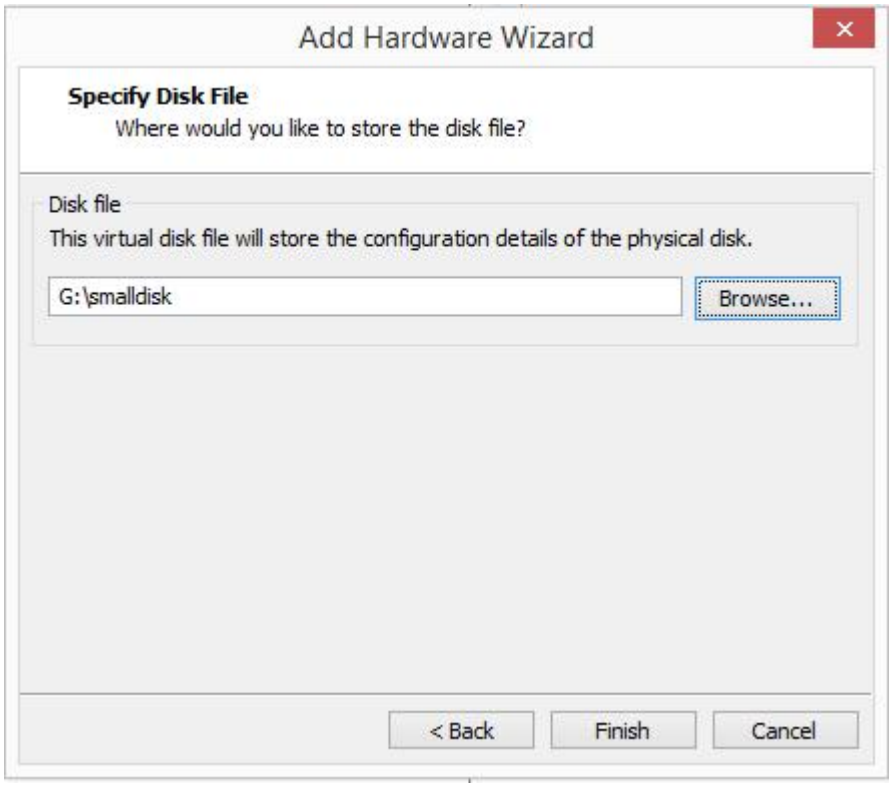
We then select to 'Create a new virtual disk'


Add Hardware Wizard
Select a Disk
Which disk do you want to use?
Disk
Create a new virtual disk
A virtual disk is composed of one or more files on the host file system, which will appear as a single hard disk to the guest operating system. Virtual disks can easily be copied or moved on the same host or between hosts.
Use an existing virtual disk
Choose this option to reuse a previously configured disk.
Use a physical disk (for advanced users)
Choose this option to give the virtual machine direct access to a local hard disk.
< Back
Next >
Cancel

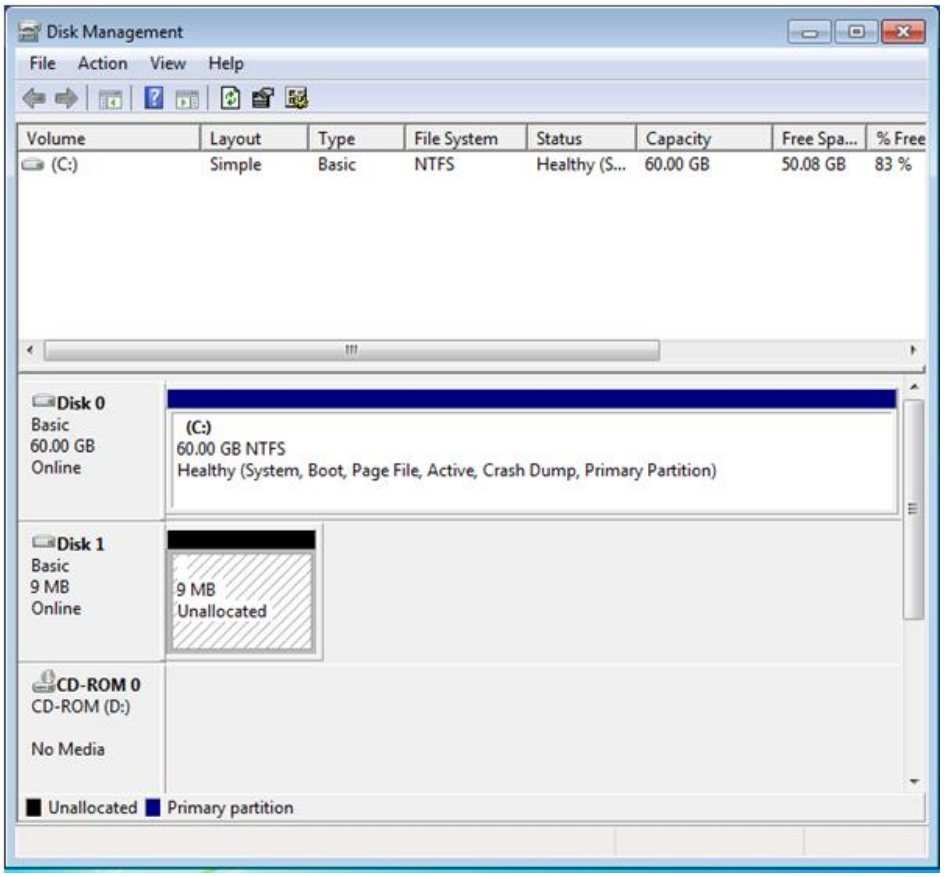
We only require a small disk, as the keys that will be stored on it are a few kilobytes in size, so for size we select 10mb.


Add Hardware Wizard
Specify Disk Capacity
How large do you want this disk to be?
Maximum disk size (GB):
0.10
Recommended size for Windows 7 x64: 60 GB
Allocate all disk space now.
Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
< Back
Next >
Cancel

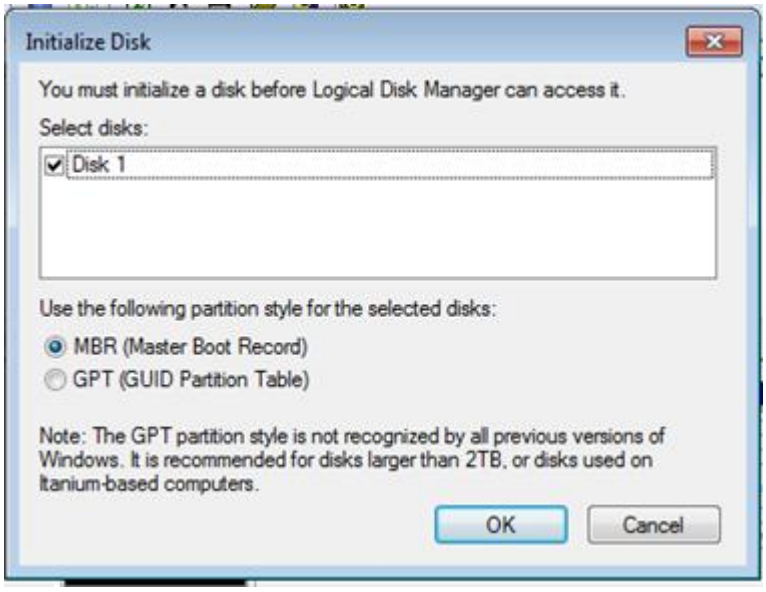
At the Specify Disk File screen we specify the path on our intended removable location



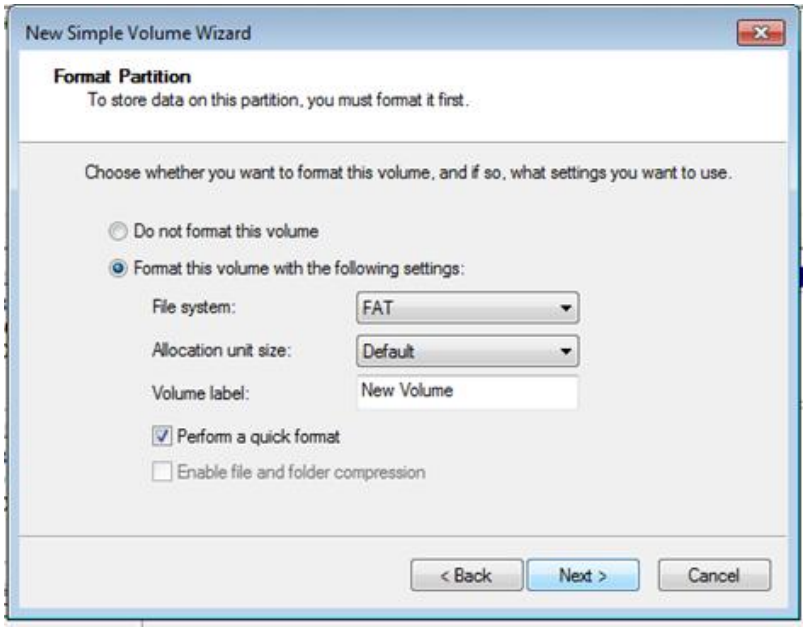
We then boot up the Virtual Machine and from the start menu enter diskmgmt.msc to open Disk Management.



We then initialise the disk as prompted.

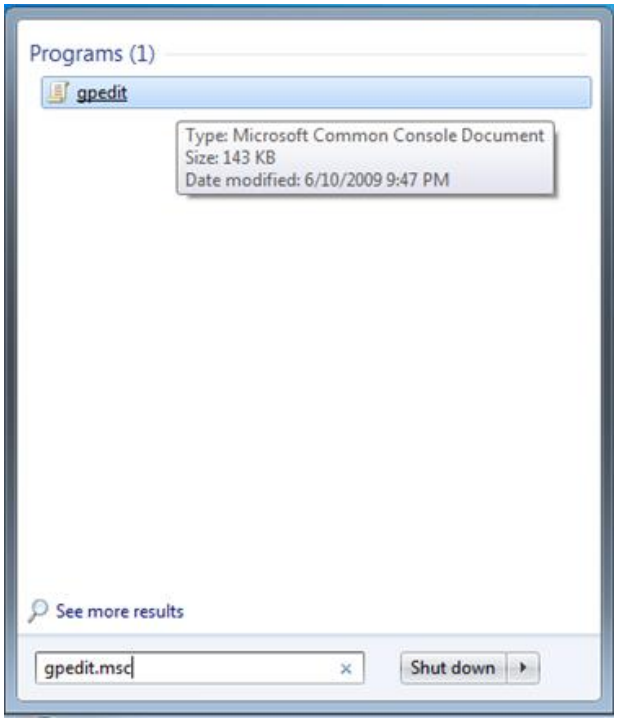

Initialize Disk
You must initialize a disk before Logical Disk Manager can access it.
Select disks:
Disk 1
Use the following partition style for the selected disks:
MBR (Master Boot Record)
GPT (GUID Partition Table)
Note: The GPT partition style is not recognized by all previous versions of Windows. It is recommended for disks larger than 2TB, or disks used on Itanium-based computers.
OK
Cancel

We then right-click the Unallocated space and select New Simple Volume to open the wizard which we follow to completion.

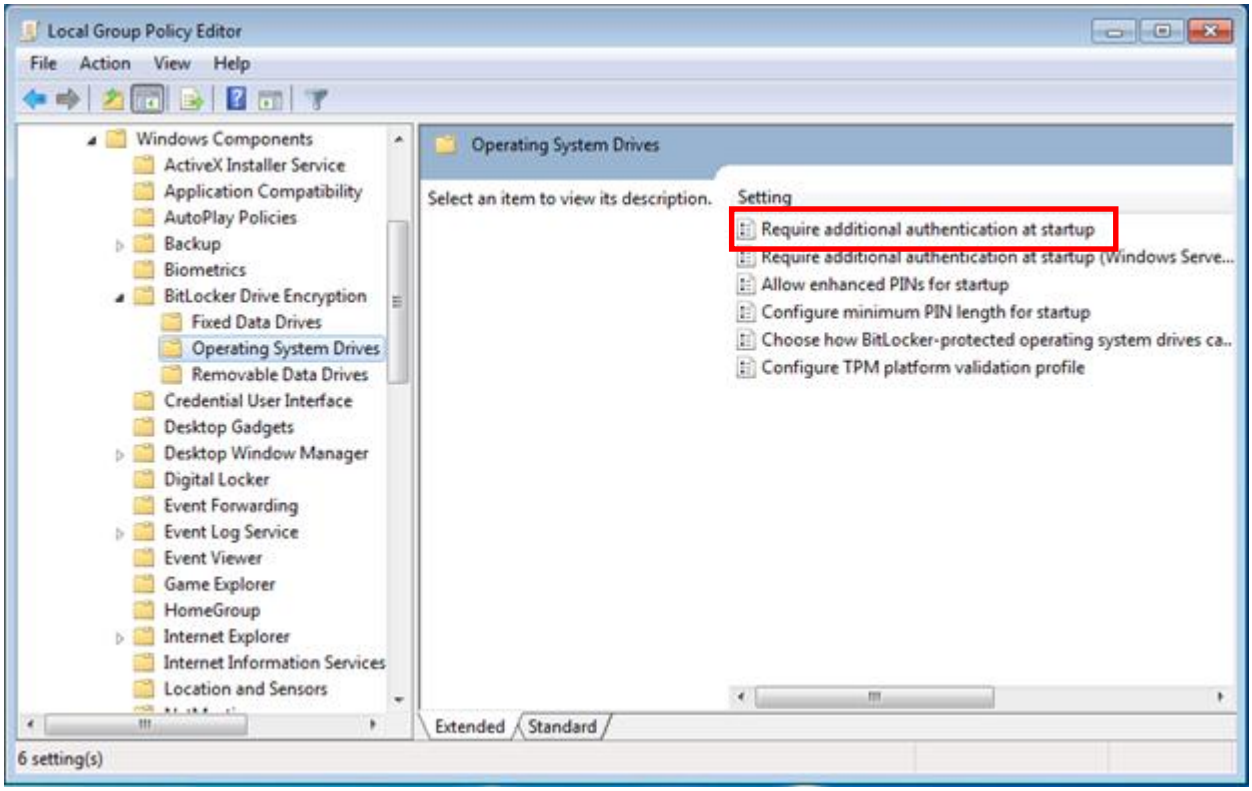

New Simple Volume Wizard
Format Partition
To store data on this partition, you must format it first.
Choose whether you want to format this volume, and if so, what settings you want to use.
Do not format this volume
Format this volume with the following settings:
File system:
FAT
Allocation unit size:
Default
Volume label:
New Volume
Perform a quick format
Enable file and folder compression
< Back
Next >
Cancel

3.3.2.2 Step 2: Group Policy Settings

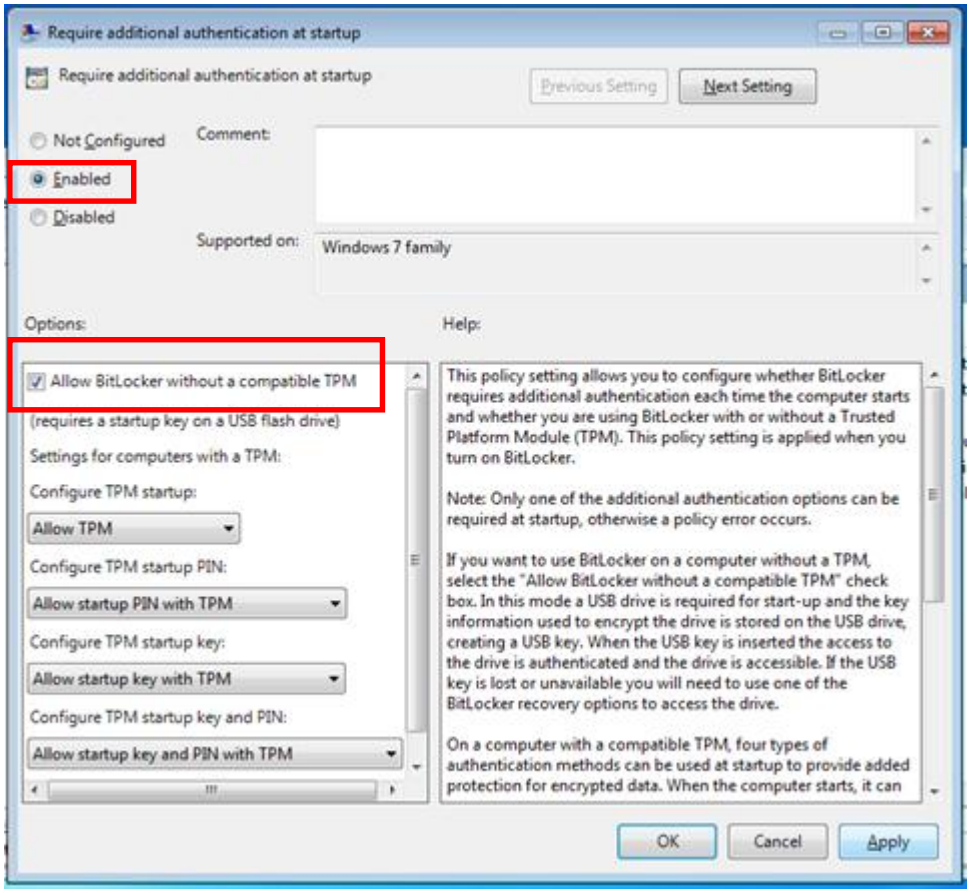
In order to enable BitLocker without a TPM, we run gpedit.msc from the start menu



We then navigate to Computer Configuration, Administrative Templates, Windows Components, BitLocker Drive Encryption, Operating System Drives and then double-click on 'require additional authentication at startup'.



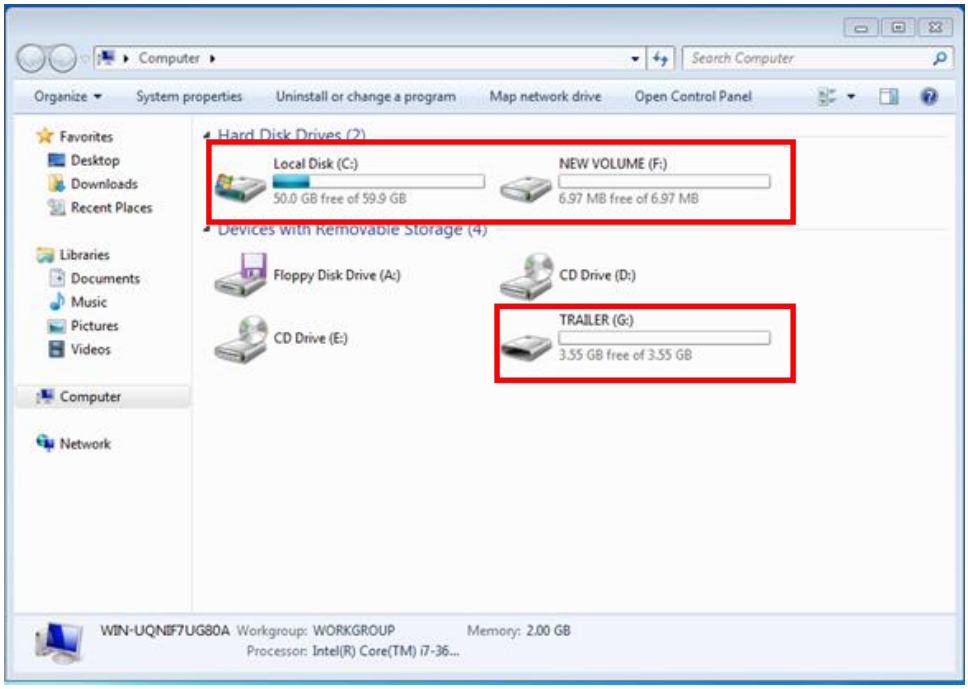
We click the radio button to enable the policy, and tick the option to 'Allow BitLocker without a compatible TPM'.


Require additional authentication at startup
Require additional authentication at startup
Previous Setting
Next Setting
Not Configured
Enabled
Disabled
Comment:
Supported on:
Windows 7 family
Options:
Help:
Allow BitLocker without a compatible TPM
(requires a startup key on a USB flash drive)
Settings for computers with a TPM:
Configure TPM startup:
Allow TPM
Configure TPM startup PIN:
Allow startup PIN with TPM
Configure TPM startup key:
Allow startup key with TPM
Configure TPM startup key and PIN:
Allow startup key and PIN with TPM
This policy setting allows you to configure whether BitLocker requires additional authentication each time the computer starts and whether you are using BitLocker with or without a Trusted Platform Module (TPM). This policy setting is applied when you turn on BitLocker.
Note: Only one of the additional authentication options can be required at startup, otherwise a policy error occurs.
If you want to use BitLocker on a computer without a TPM, select the "Allow BitLocker without a compatible TPM" check box. In this mode a USB drive is required for start-up and the key information used to encrypt the drive is stored on the USB drive, creating a USB key. When the USB key is inserted the access to the drive is authenticated and the drive is accessible. If the USB key is lost or unavailable you will need to use one of the BitLocker recovery options to access the drive.
On a computer with a compatible TPM, four types of authentication methods can be used at startup to provide added protection for encrypted data. When the computer starts, it can
OK
Cancel
Apply

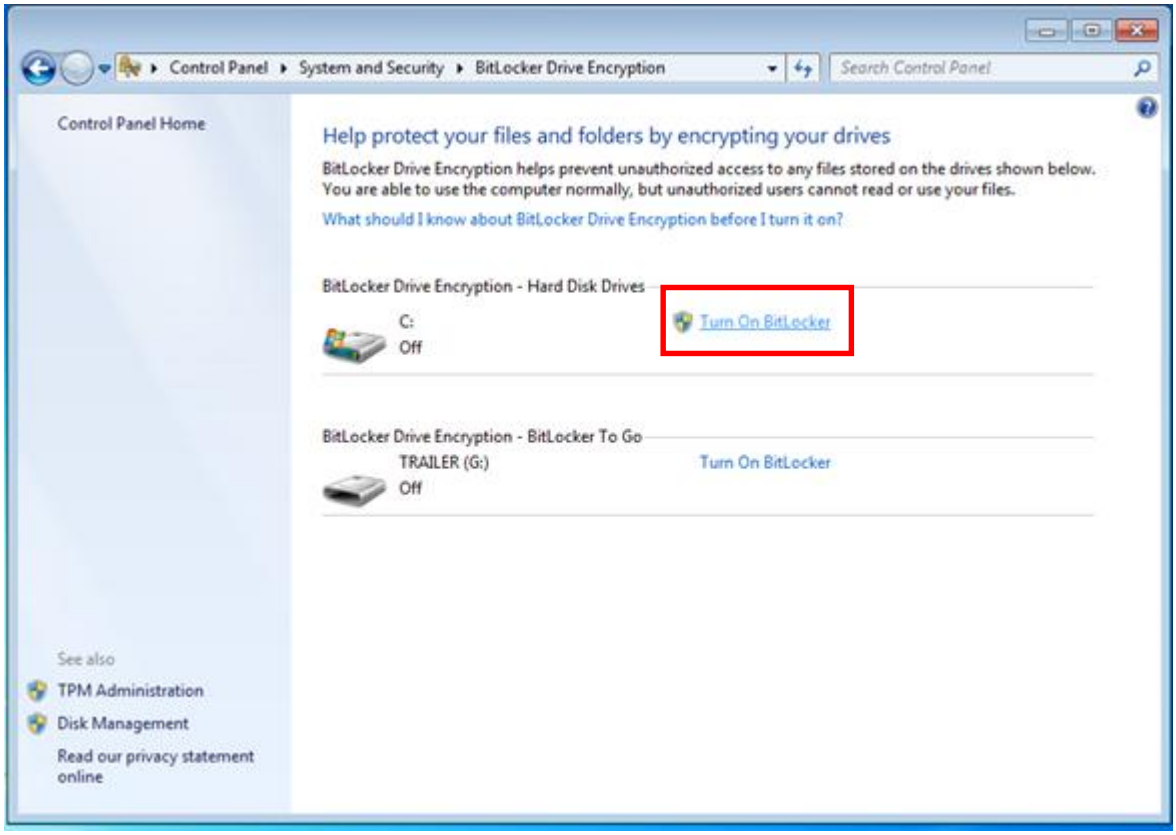
3.3.2.3 Step 3: Setup BitLocker on the System Drive and Write Keys to Temporary USB Drive

Our next step is to mount a temporary USB drive to the virtual machine, by selecting the VM dropdown menu, removable devices, the USB device name and 'connect (disconnect from host)'

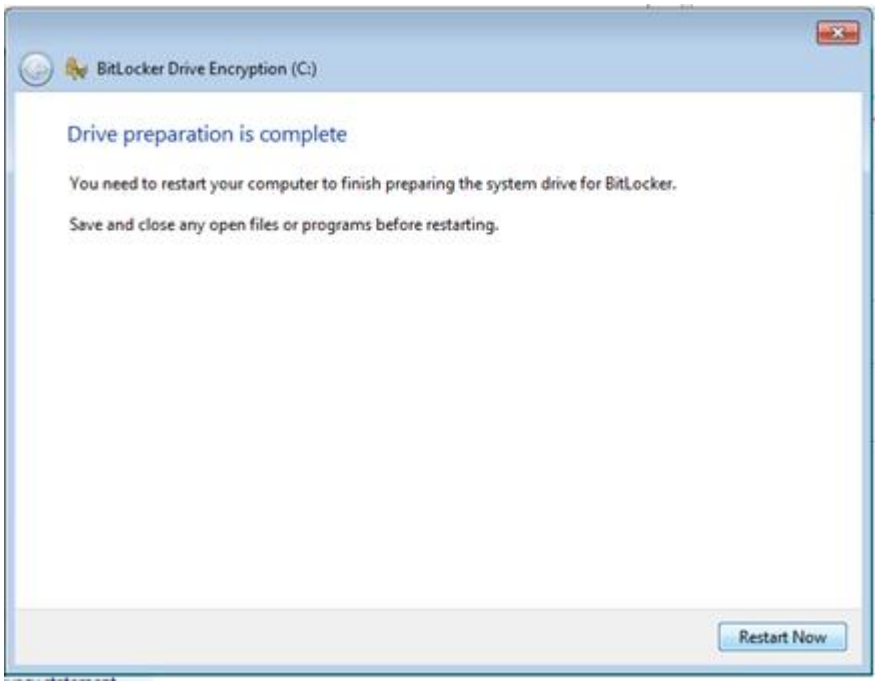
In our Virtual machine, we then have 3 disks. The Main Hard Disk, the small hard disk, and the USB drive.



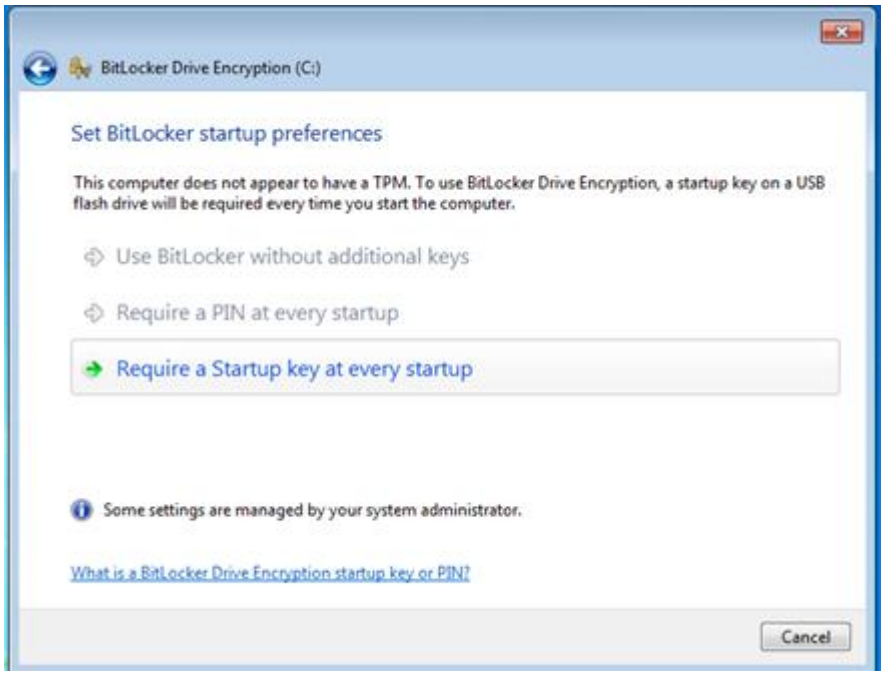
We then open the control panel and navigate to System and Security, and on to the BitLocker Drive Encryption control panel, where we click 'Turn On BitLocker' for our system Drive.


Control Panel
System and Security
BitLocker Drive Encryption
Search Control Panel
Control Panel Home
Help protect your files and folders by encrypting your drives
BitLocker Drive Encryption helps prevent unauthorized access to any files stored on the drives shown below.
You are able to use the computer normally, but unauthorized users cannot read or use your files.
What should I know about BitLocker Drive Encryption before I turn it on?
BitLocker Drive Encryption - Hard Disk Drives
C:
Off
Turn On BitLocker
BitLocker Drive Encryption - BitLocker To Go
TRAILER (G:)
Off
Turn On BitLocker
See also
TPM Administration
Disk Management
Read our privacy statement online

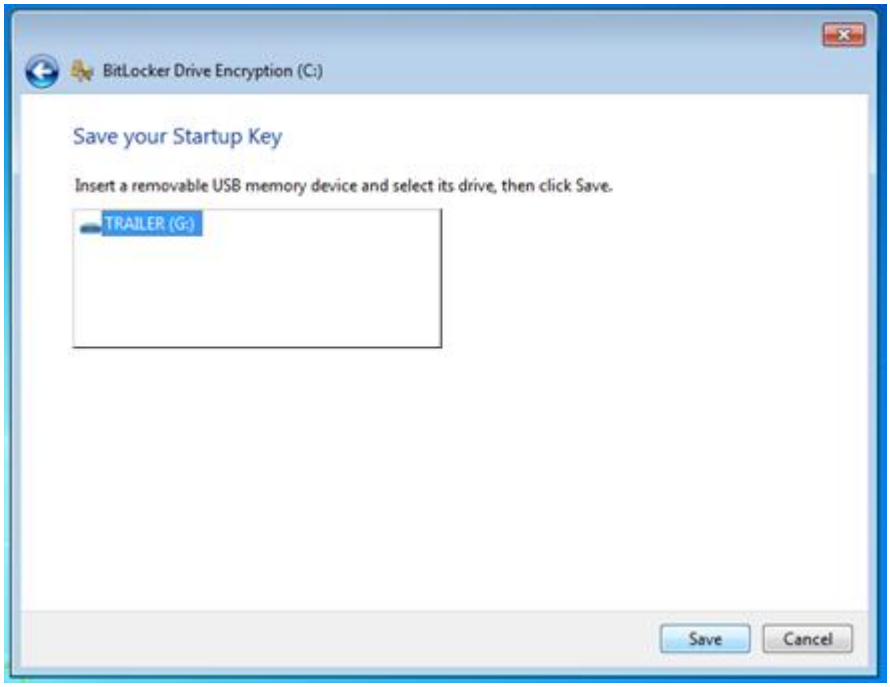
We follow the wizard through to completion and click 'Restart Now' to finish preparing the system drive.


BitLocker Drive Encryption (C:)
Drive preparation is complete
You need to restart your computer to finish preparing the system drive for BitLocker.
Save and close any open files or programs before restarting.
Restart Now

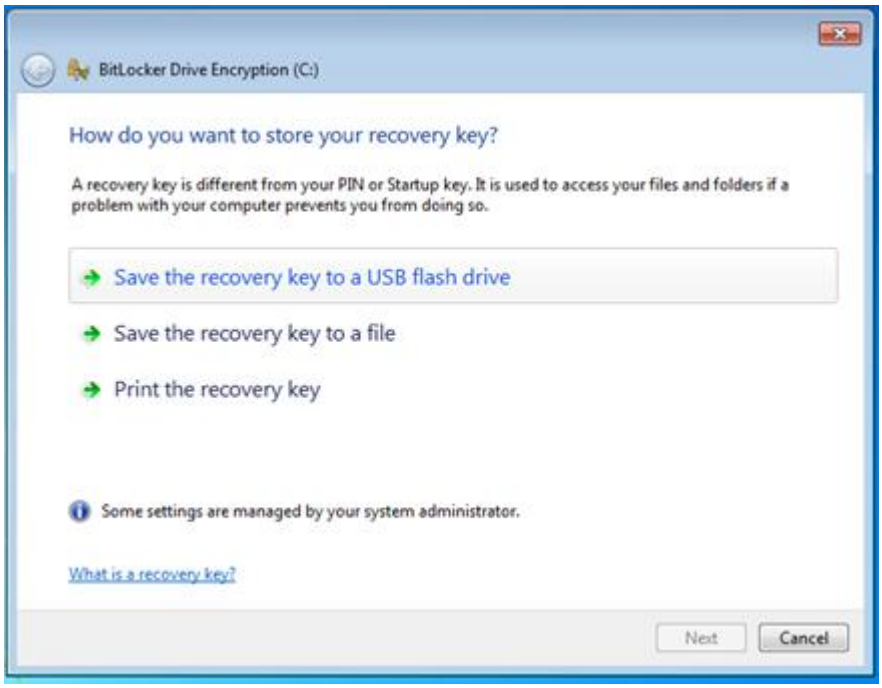
When Windows restarts the BitLocker startup preference dialog is displayed with the only available option being 'Require a Startup key at every startup', which we click.


BitLocker Drive Encryption (C:)
Set BitLocker startup preferences
This computer does not appear to have a TPM. To use BitLocker Drive Encryption, a startup key on a USB flash drive will be required every time you start the computer.
Use BitLocker without additional keys
Require a PIN at every startup
Require a Startup key at every startup
Some settings are managed by your system administrator.
What is a BitLocker Drive Encryption startup key or PIN?
Cancel

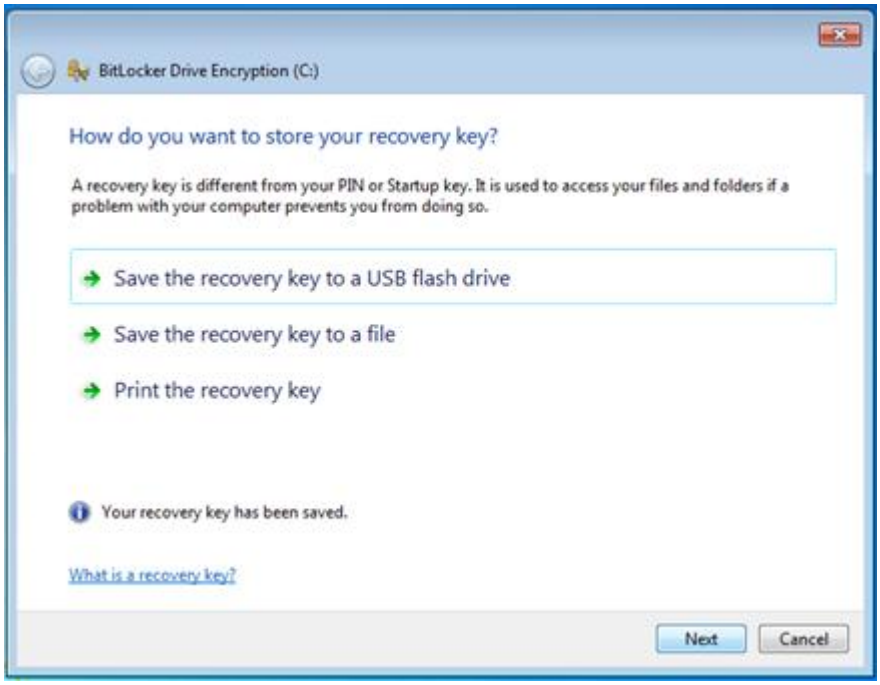
At the next window we select the mounted USB drive (it should be the only option) and click 'Save'.


BitLocker Drive Encryption (C:)
Save your Startup Key
Insert a removable USB memory device and select its drive, then click Save.
TRAILER (G:)
Save
Cancel

When prompted, we save the recovery key to the same USB drive for simplicity:

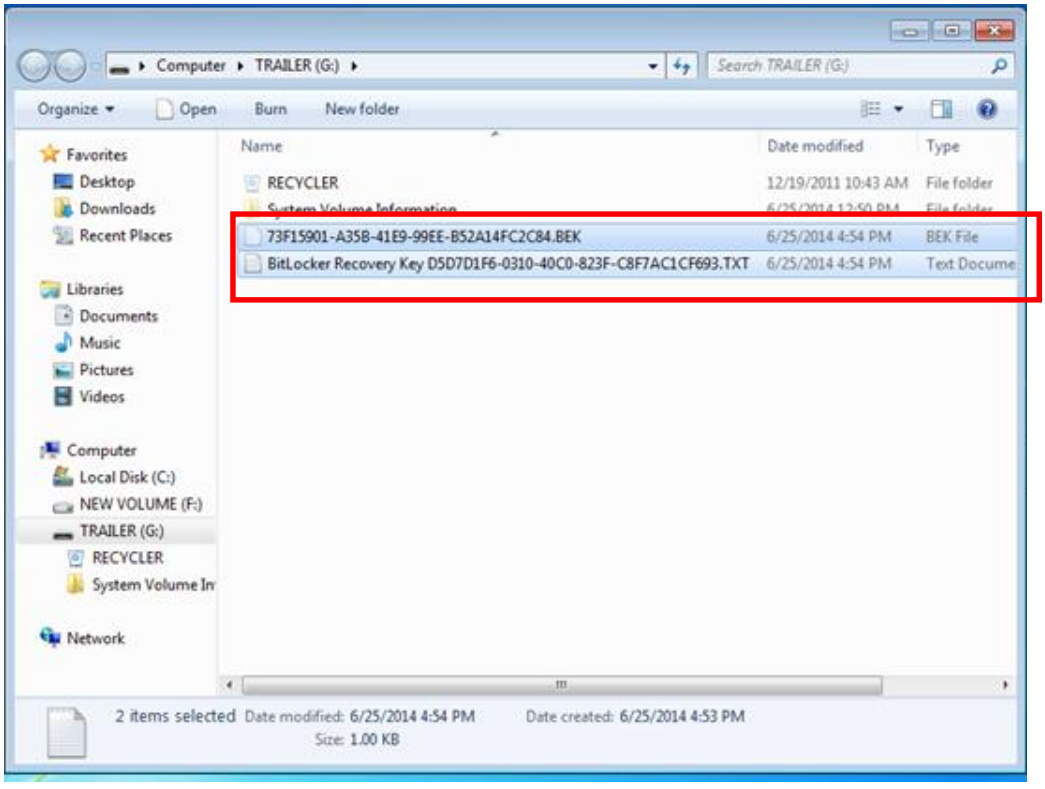

BitLocker Drive Encryption (C:)
How do you want to store your recovery key?
A recovery key is different from your PIN or Startup key. It is used to access your files and folders if a problem with your computer prevents you from doing so.
Save the recovery key to a USB flash drive
Save the recovery key to a file
Print the recovery key
Some settings are managed by your system administrator.
What is a recovery key?
Next
Cancel

The next window confirms that the recovery key has been saved, at which point we pause, without closing this window.

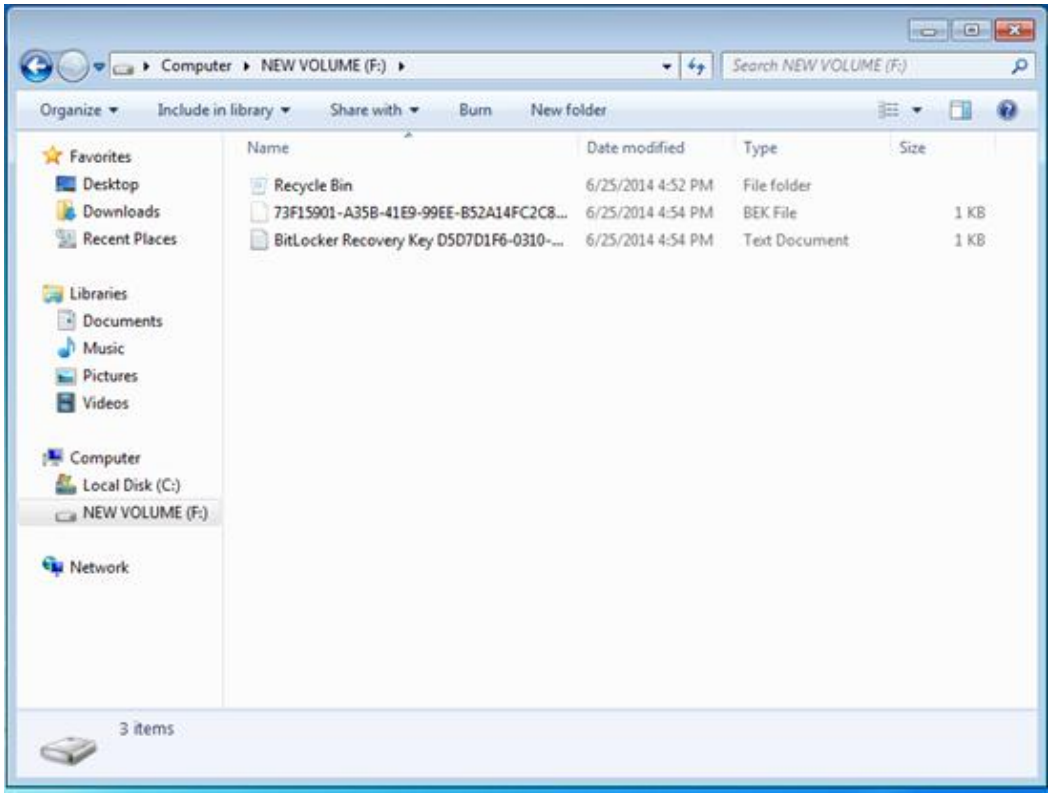

BitLocker Drive Encryption (C:)
How do you want to store your recovery key?
A recovery key is different from your PIN or Startup key. It is used to access your files and folders if a problem with your computer prevents you from doing so.
Save the recovery key to a USB flash drive
Save the recovery key to a file
Print the recovery key
Your recovery key has been saved.
What is a recovery key?
Next
Cancel

3.3.2.4 Step 4: Copy BitLocker Keys to Virtual Disk

The next step is to open the mounted USB Drive in windows explorer. A .BEK and a .TXT file as shown below should be visible, if they are not it is necessary to change the folder properties to display hidden as well as system files.



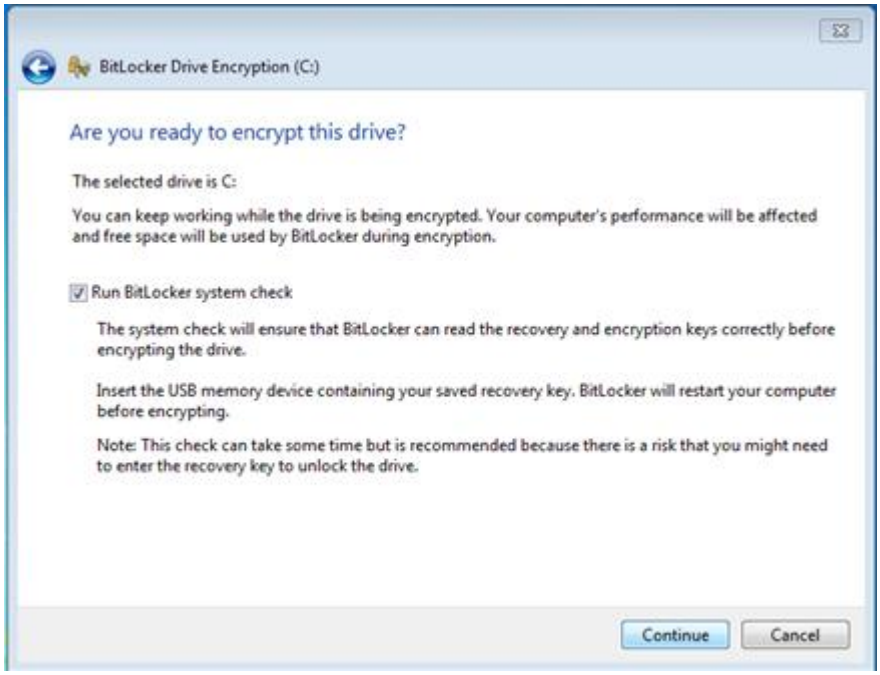
We then copy the two files from the USB drive to our virtual hard drive:



It is now safe to unmount the temporary USB drive.

3.3.2.5 Step 5: Encryption

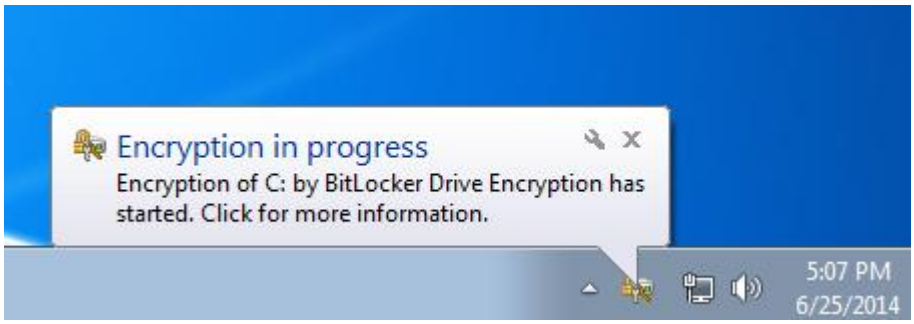
Finally we return to the wizard from step 3 above, and select 'Continue', ensuring that 'Run BitLocker system check' is ticked.


BitLocker Drive Encryption (C:)
Are you ready to encrypt this drive?
The selected drive is C:
You can keep working while the drive is being encrypted. Your computer's performance will be affected and free space will be used by BitLocker during encryption.
Run BitLocker system check
The system check will ensure that BitLocker can read the recovery and encryption keys correctly before encrypting the drive.
Insert the USB memory device containing your saved recovery key. BitLocker will restart your computer before encrypting.
Note: This check can take some time but is recommended because there is a risk that you might need to enter the recovery key to unlock the drive.
Continue
Cancel

We then select 'Restart now'.

BitLocker Drive Encryption
The computer must be restarted
Insert the USB memory device containing the recovery key.
Restart now
Restart later

A short time after the system boots back up, a notification popup is displayed advising that encryption has started.


Encryption in progress
Encryption of C: by BitLocker Drive Encryption has started. Click for more information.
5:07 PM
6/25/2014

This process takes a substantial period of time, and when complete, our system drive is then encrypted, such that if the drive containing the virtual hard drive is not mounted to the virtual machine, the VM will not boot, nor can it be read in any way.

Part B

4. Part B - Task A

- *Using Virtual-box, VMware Workstation or similar you are to create several virtual machines:*
- *Three Servers with server 2008 or later installed*
  - *2 of these servers are to be installed with Standard, Enterprise or Datacenter edition using the full GUI install and named Server1 and Server2 accordingly.*
  - *The third server is to be a Standard Server Core installation and named MS-Core*
- *One Client machine with Windows 7 or later installed and named Client1*
- *Clone this Client Virtual Machine and rename the workstation Client2*
- *Please use adequate sizes for the Hard Disk partitions on each of the Client machines. Configure the servers with 200 GB hard disks. For the Operating System create a partition of 60 GB accordingly.*
- *RAM on all machines is to be 512 MB or greater depending on your amount of available RAM*
- *All passwords are to be Pa$$w0rd.*
- *Give all machines a static IP address from the range 192.168.0.0/24.*

4.1 Preamble

Windows Server 2008 is a Microsoft server operating system. Windows Server operating systems are built to meet enterprise requirements such as corporate networking, internet/intranet hosting and databases. The main feature that was introduced with Windows Server was the Active Directory. This user manual describes and explains tasks related to Active Directory which would typically be carried out in an enterprise environment. Active Directory can be described as "a directory service that allows businesses to define, manage, access and secure network resources including files, printers, people and applications"[5]. Prior to the introduction of directory systems, users were required to authenticate themselves multiple times, across multiple servers, to access different resources. Active Directory provides a single-sign in that facilitates access to all resources.

Described hereunder is the procedure for the installation of three different operating systems (OS). The first OS, Microsoft Windows Server 2008 R2 Datacenter (Full Installation), will be installed on computers called Server1 and Server2.

Microsoft Windows Server 2008 R2 Standard (Server Core Installation) is the second OS we will use, and will be installed on a computer called MS-Core. Microsoft Windows Server 2008 R2 Standard (Server Core Installation) provides a minimal installation of Microsoft Windows Server

[5] T.Brett, Introduction to Active Directory Services, June 10 , 2014.

2008 R2 which supports the installation of limited server roles, for example it cannot provide an Application Server role or Remote Assistance.

The cost of an OS is often a determining factor in their selection. As noted by Microsoft, 'The Full installation option of Windows Server 2008 still installs many services and other components that are often not needed for a particular usage scenario'[6]. Therefore the Server Core Installation may well be the preferred option for an organisation, depending on their requirements and budget.

Thirdly, two client workstations named Client1 and Client2 will be set up with Microsoft Windows 7 Professional 64-bit installed on them.

When the required computers are setup and named, with relevant OS installed, we will then assign static IP addresses to the computers, as per the assignment brief requirement above, with an address from the range 192.168.0.0/24. This is what is known as a Classless Internet Domain Routing (CIDR) address. CIDR is regarded as "the method to specify more flexible IP address classes" [7]. CIDR was created as it became clear that available IP addresses were running out as more individuals and corporations participated on the Internet. As a Class B address range is usually too large for most companies, and a class C address range may be too small, CIDR provides the flexibility to increase or decrease the class sizes as necessary. The CIDR provided, 192.168.0.0/24 represents an IPv4 address and its associated routing prefix 192.168.100.0, or equivalently, its subnet mask 255.255.255.0. The /24 relates to the amount of 1's in the subnet mask, i.e. 11111111 11111111 11111111 00000000, which is equal to 255.255.255.0. In summation, 24 bits identify the host portion, 8 bits identify the node. Therefore we will provide each node on our network with a static IP address of 192.168.0.x, with x being between 1 and 255, and with a subnet mask of 255.255.255.0.

4.2 System Requirements

The system requirements for the installation of Windows Server 2008 R2 are as follows [8]:

- Processor: 1.4 GHz 64-bit processor
- RAM: Minimum: 512 MB
  Maximum: 32 GB (for Windows Server 2008 R2 Standard)
  2 TB (for Windows Server 2008 R2 Enterprise)
  2 TB (for Windows Server 2008 R2 Datacenter)
- Estimated minimum disk space requirements for the system partition: 32 GB

The system requirements for the installation of Windows 7 Professional 64-bit are as follows [9]:

- Processor: 1 GHz 32-bit (x86) or 64-bit (x64) processor

[6] http://msdn.microsoft.com/en-us/library/dd184075.aspx. Accessed July 17, 2014.
[7] T.Brett, IP Addressing / CIDR, July 8, 2014.
[8] http://technet.microsoft.com/en-us/library/dd379511(v=ws.10).aspx. Accessed July 17, 2014.
[9] http://windows.microsoft.com/en-IE/windows7/products/system-requirements. Accessed July 17, 2014.

- RAM: 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
- Disk Space: 16 GB available hard disk space (32-bit) or 20 GB (64-bit)
- Graphics: DirectX 9 graphics device with WDDM 1.0 or higher driver

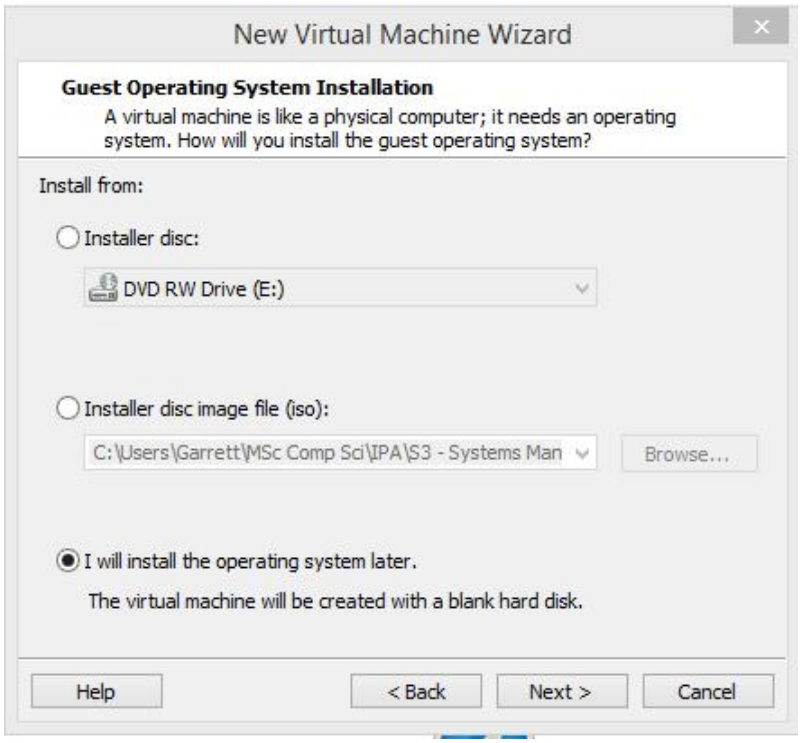
4.3 Procedure

4.3.1 Subtask 1 - Create Three Server Virtual Machines

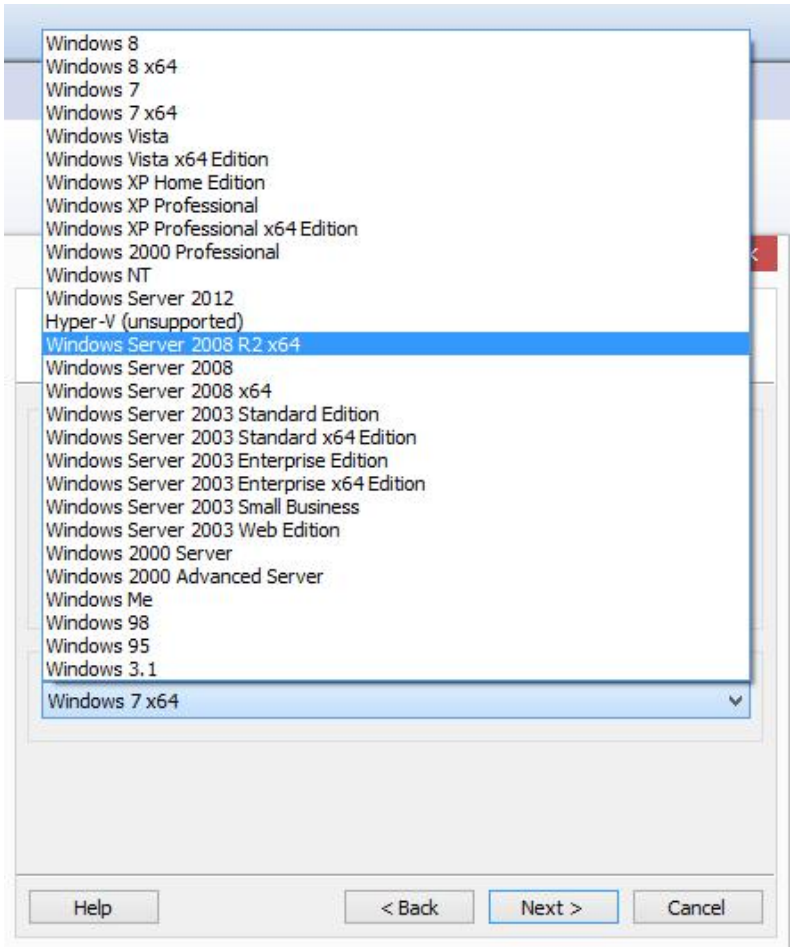
4.3.1.1 Step 1

From VMware Workstation we select File - New Virtual Machine, and select a Typical (recommended) install. As we will install the operating system later it is not necessary to do a Custom (advanced) configuration. A typical install is required to enable configuration of Hard Disk Drive (HDD) partitions during installation.

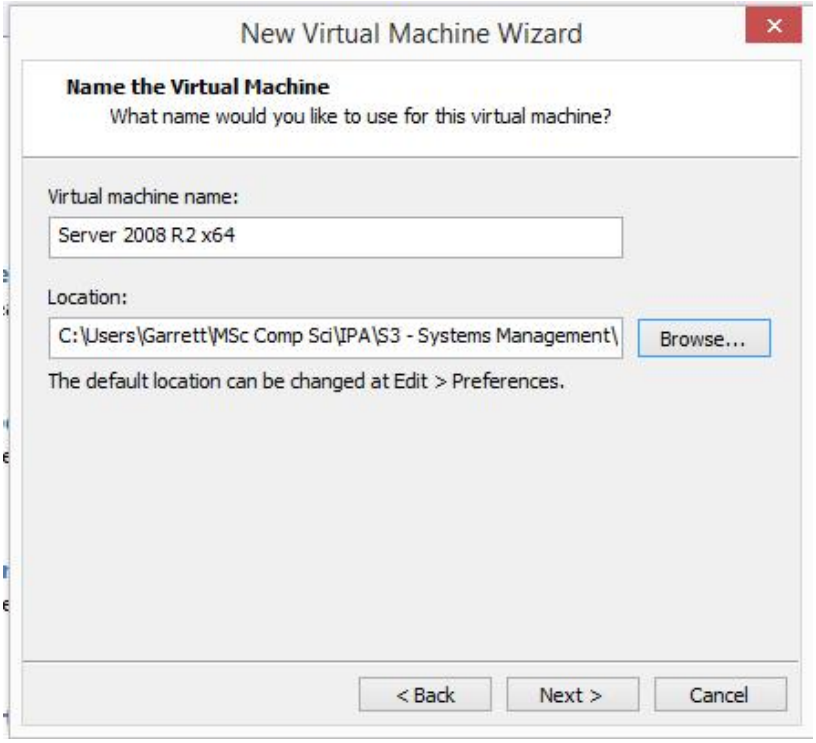
New Virtual Machine Wizard
Welcome to the New Virtual Machine Wizard
What type of configuration do you want?
Typical (recommended)
Create a Workstation 9.0 virtual machine in a few easy steps.
Custom (advanced)
Create a virtual machine with advanced options, such as a SCSI controller type, virtual disk type and compatibility with older VMware products.
VMware
Workstation 9
Help
< Back
Next >
Cancel


New Virtual Machine Wizard
Guest Operating System Installation
A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?
Install from:
Installer disc:
DVD RW Drive (E:)
Installer disc image file (iso):
C:\Users\Garrett\MSc Comp Sci\IPA\S3 - Systems Man
Browse...
I will install the operating system later.
The virtual machine will be created with a blank hard disk.
Help
< Back
Next >
Cancel

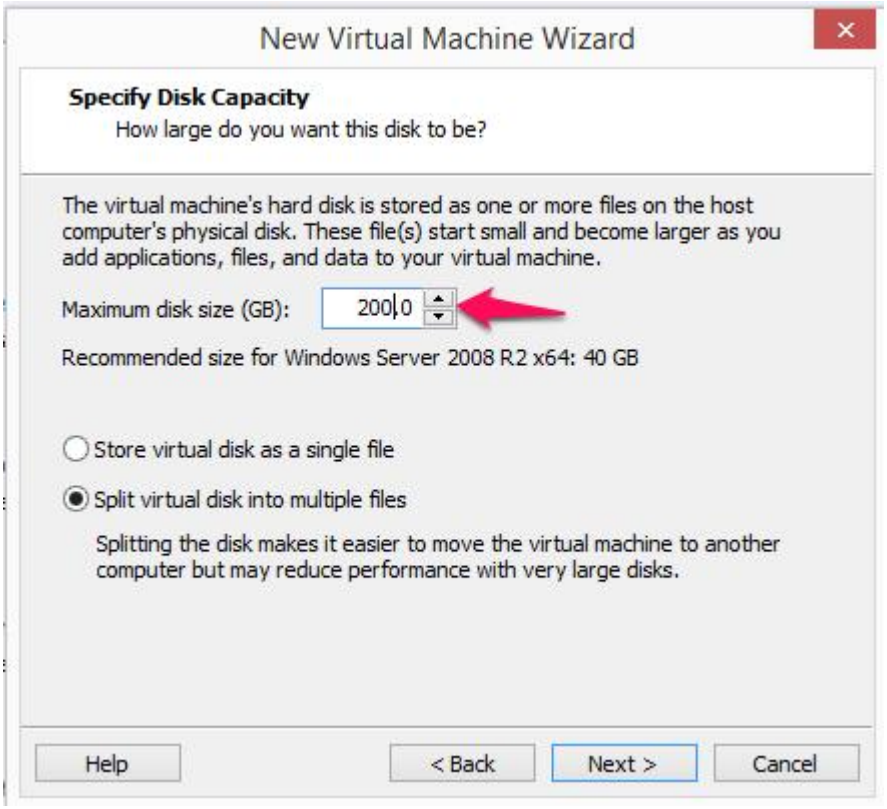
We then select the OS that we want to install, namely Windows Server R2 x64



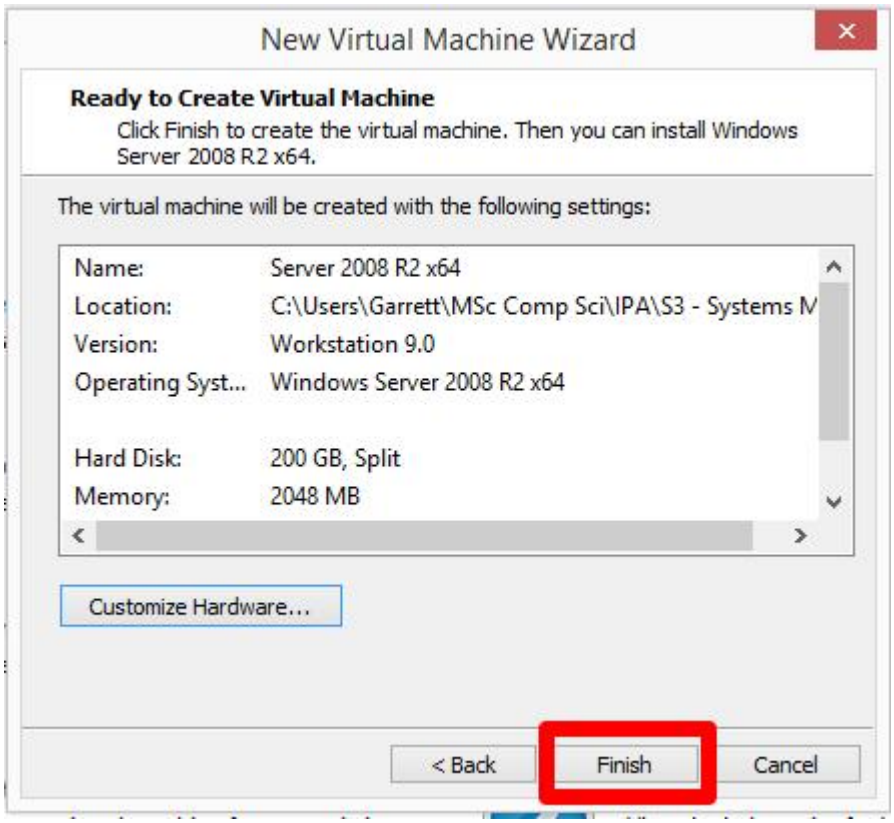
We then name the VM and chose where to save all of the files associated with it


New Virtual Machine Wizard
Name the Virtual Machine
What name would you like to use for this virtual machine?
Virtual machine name:
Server 2008 R2 x64
Location:
C:\Users\Garrett\MSc Comp Sci\IPA\S3 - Systems Management\
Browse...
The default location can be changed at Edit > Preferences.
< Back
Next >
Cancel

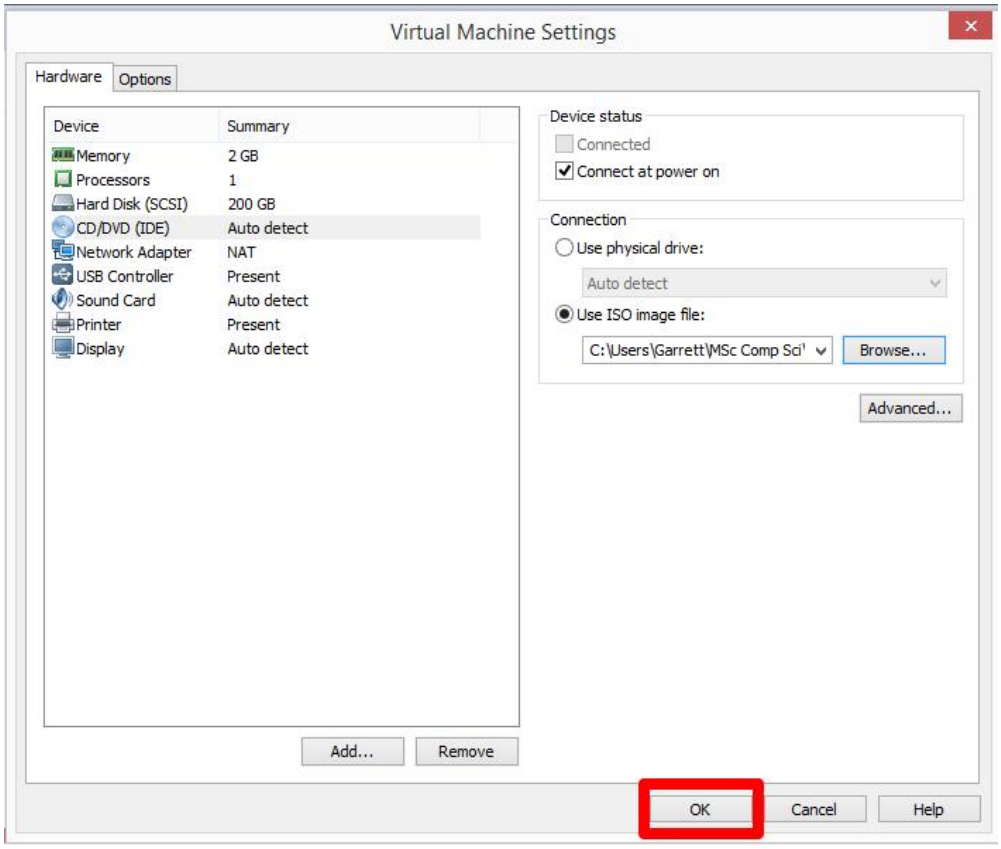
We then set the disk capacity of the virtual HDD at 200GB as specified in the assignment brief. We select the option to Split virtual disk into multiple files, which results in the use of thin provisioning (i.e. the VM grows as the files grow), avoiding the full 200GB being immediately taken from the host machine.


New Virtual Machine Wizard
Specify Disk Capacity
How large do you want this disk to be?
The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.
Maximum disk size (GB):
200.0
Recommended size for Windows Server 2008 R2 x64: 40 GB
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
Help
< Back
Next >
Cancel

We then click Finish to complete the creation of the VM.

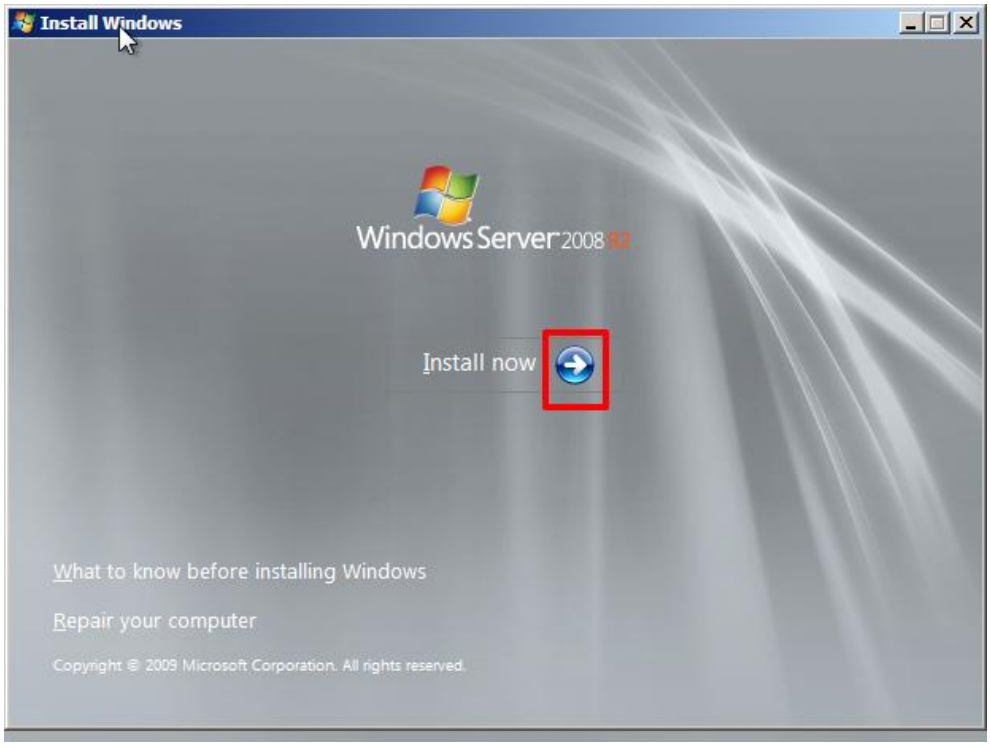

New Virtual Machine Wizard
Ready to Create Virtual Machine
Click Finish to create the virtual machine. Then you can install Windows Server 2008 R2 x64.
The virtual machine will be created with the following settings:
Name: Server 2008 R2 x64
Location: C:\Users\Garrett\MSc Comp Sci\IPA\S3 - Systems M
Version: Workstation 9.0
Operating Syst... Windows Server 2008 R2 x64
Hard Disk: 200 GB, Split
Memory: 2048 MB
Customize Hardware...
< Back
Finish
Cancel

Our next step is to locate the installation ISO image file of the OS. We click on Edit virtual machine settings, select CD/DVD (IDE), click the Use ISO image file radio button and browse to the required ISO image file. We can then click on Power on this virtual machine.

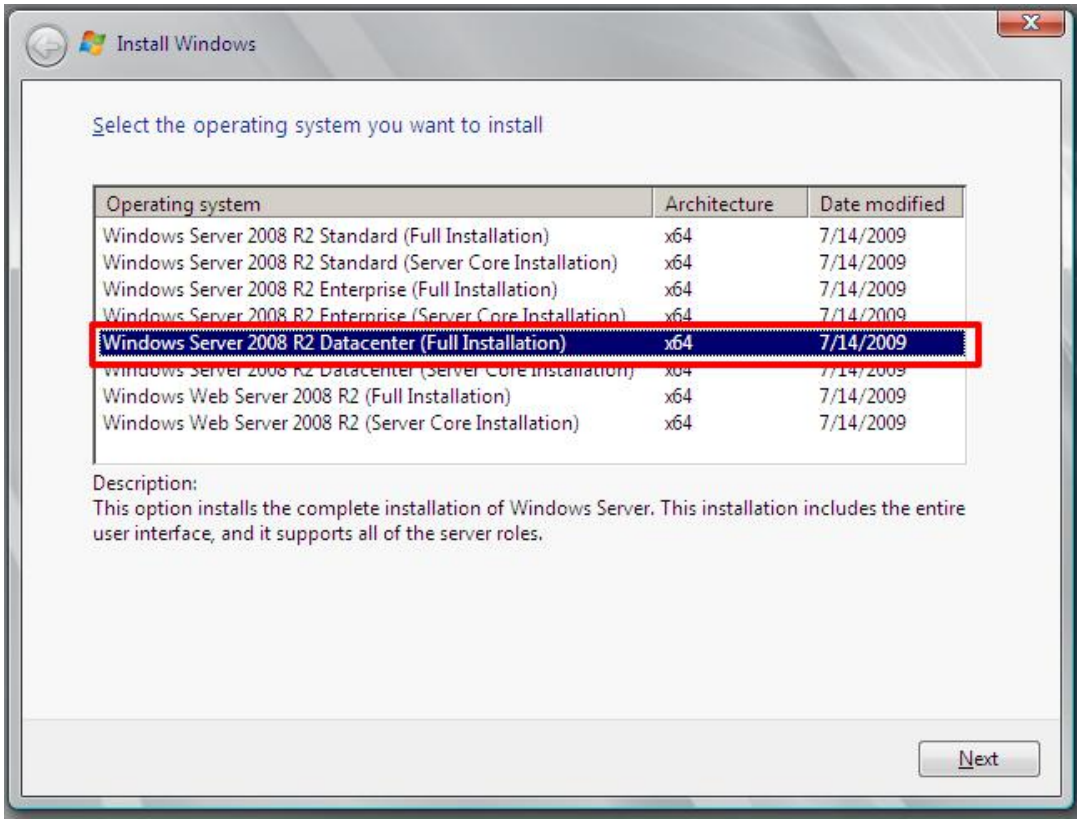


4.3.1.2 Step 2 - Installation of Windows Server Operating Systems

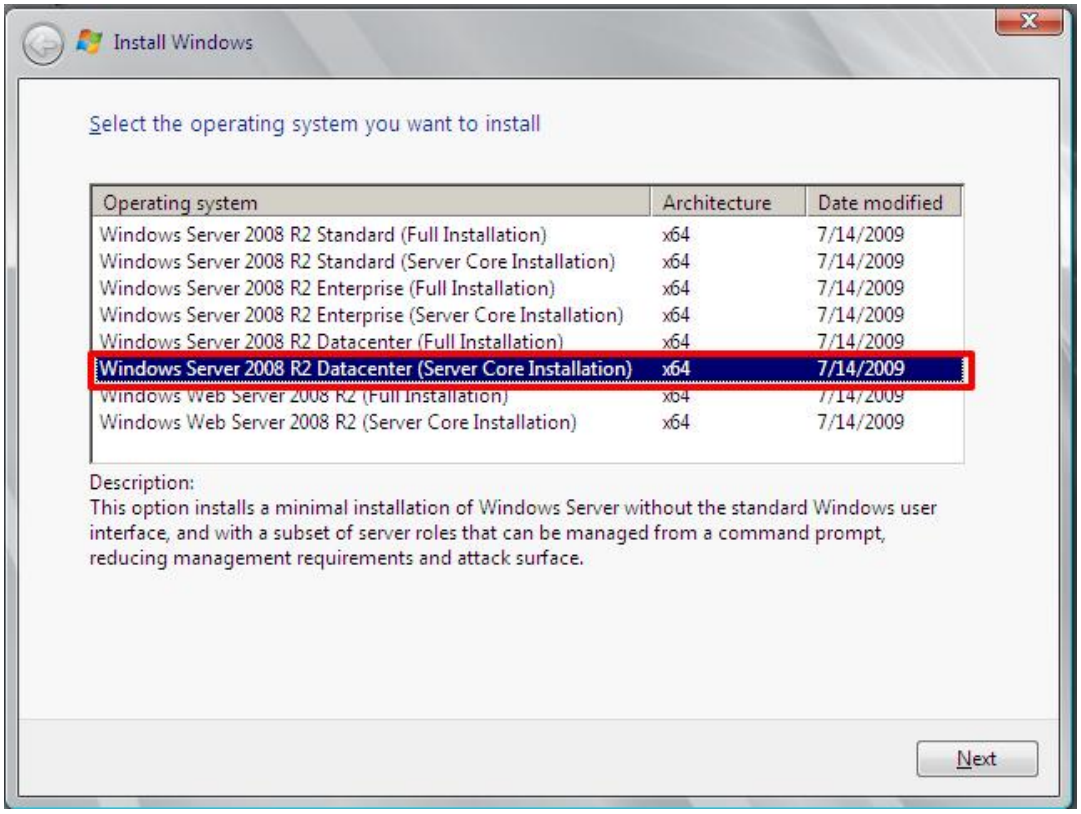
When we power on the VM the Windows Server 2008 R2 installation begins.


Install Windows
Windows Server 2008 R2
Install now
What to know before installing Windows
Repair your computer
Copyright © 2009 Microsoft Corporation. All rights reserved.

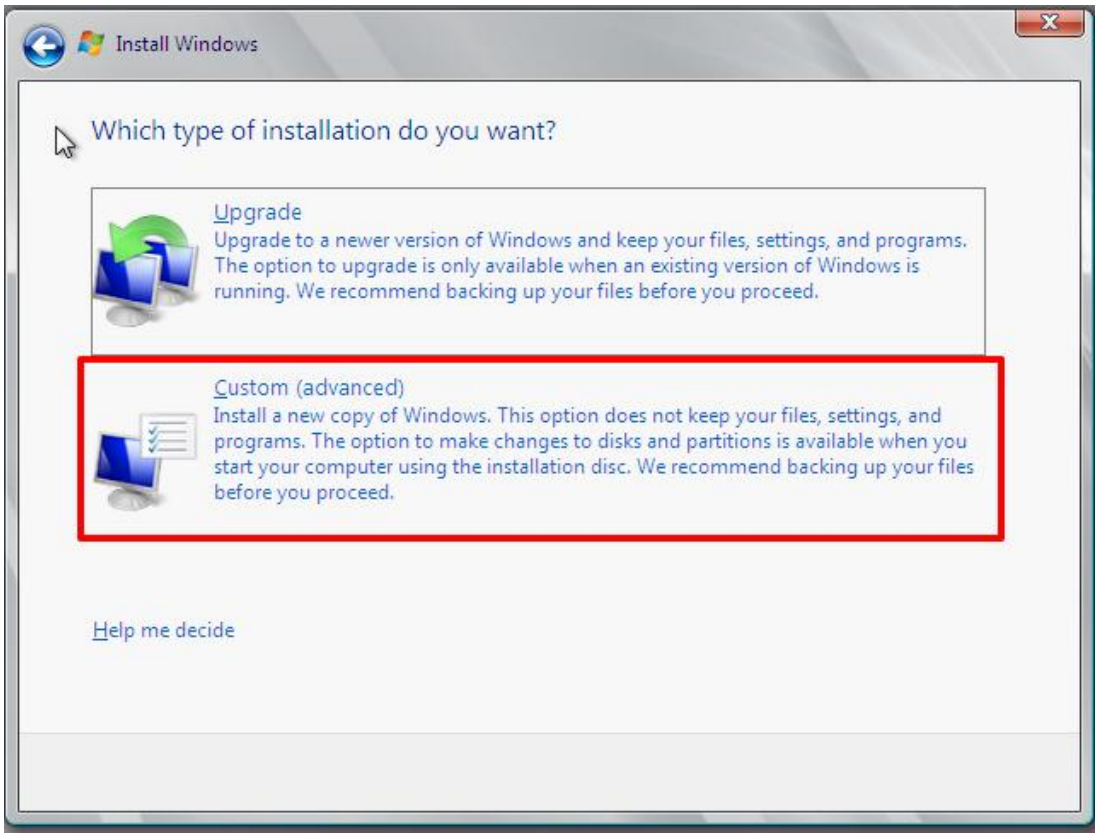
During the installation process we select the Windows Server 2008 Datacentre (Full Installation) for Server 1 and Server 2.


Install Windows
Select the operating system you want to install
Operating system
Architecture
Date modified
Windows Server 2008 R2 Standard (Full Installation) x64 7/14/2009
Windows Server 2008 R2 Standard (Server Core Installation) x64 7/14/2009
Windows Server 2008 R2 Enterprise (Full Installation) x64 7/14/2009
Windows Server 2008 R2 Enterprise (Server Core Installation) x64 7/14/2009
Windows Server 2008 R2 Datacenter (Full Installation) x64 7/14/2009
Windows Server 2008 R2 Datacenter (Server Core Installation) x64 7/14/2009
Windows Web Server 2008 R2 (Full Installation) x64 7/14/2009
Windows Web Server 2008 R2 (Server Core Installation) x64 7/14/2009
Description:
This option installs the complete installation of Windows Server. This installation includes the entire user interface, and it supports all of the server roles.
Next

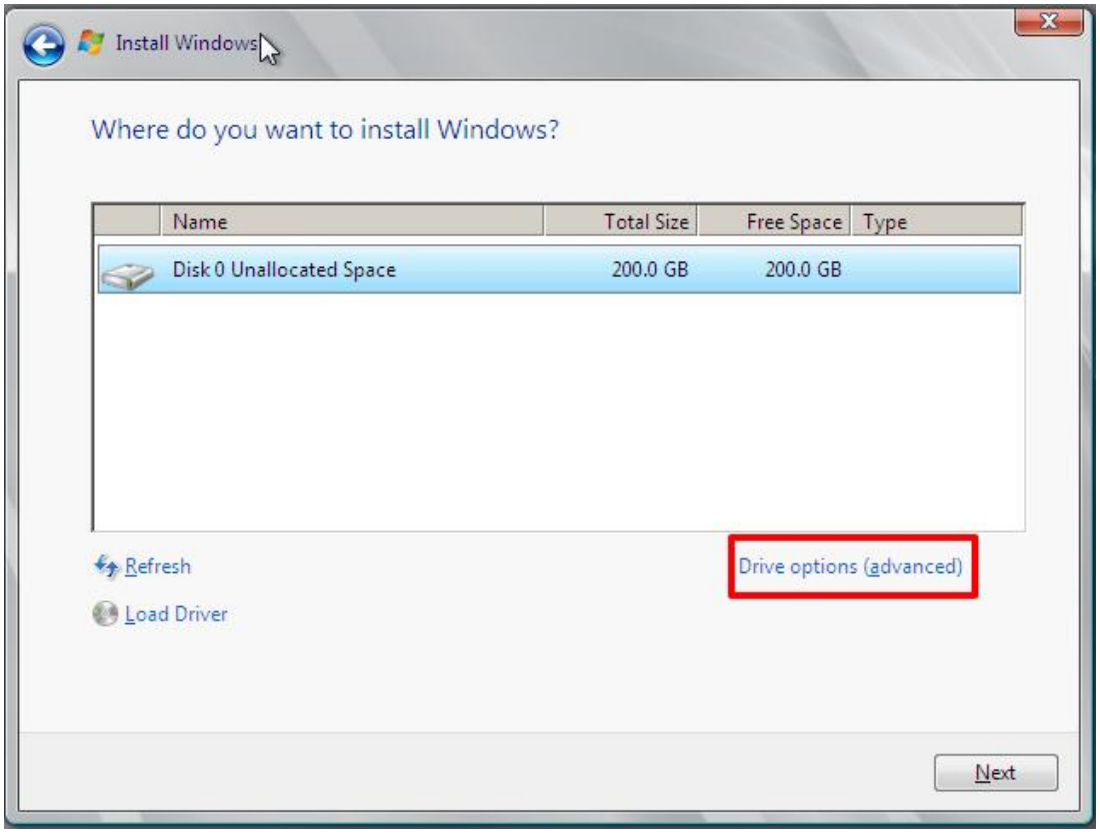
We select the Windows Server 2008 R2 Datacentre (Server Core Installation) for the MS-Core Server VM.


Install Windows
Select the operating system you want to install
Operating system
Architecture
Date modified
Windows Server 2008 R2 Standard (Full Installation) x64 7/14/2009
Windows Server 2008 R2 Standard (Server Core Installation) x64 7/14/2009
Windows Server 2008 R2 Enterprise (Full Installation) x64 7/14/2009
Windows Server 2008 R2 Enterprise (Server Core Installation) x64 7/14/2009
Windows Server 2008 R2 Datacenter (Full Installation) x64 7/14/2009
Windows Server 2008 R2 Datacenter (Server Core Installation) x64 7/14/2009
Windows Web Server 2008 R2 (Full Installation) x64 7/14/2009
Windows Web Server 2008 R2 (Server Core Installation) x64 7/14/2009
Description:
This option installs a minimal installation of Windows Server without the standard Windows user interface, and with a subset of server roles that can be managed from a command prompt, reducing management requirements and attack surface.
Next

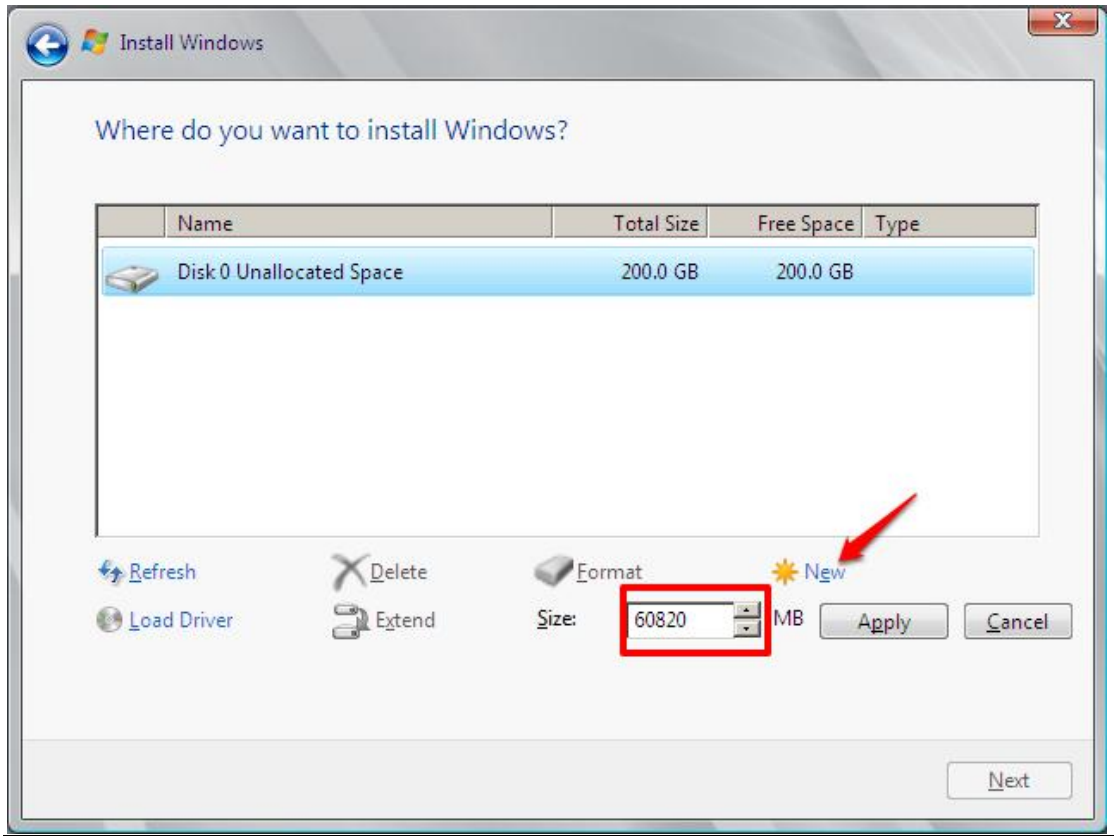
We follow the installation wizard until we reach the installation type window where we select Custom (Advanced) installation in order to allow us to partition the HDD during the installation.

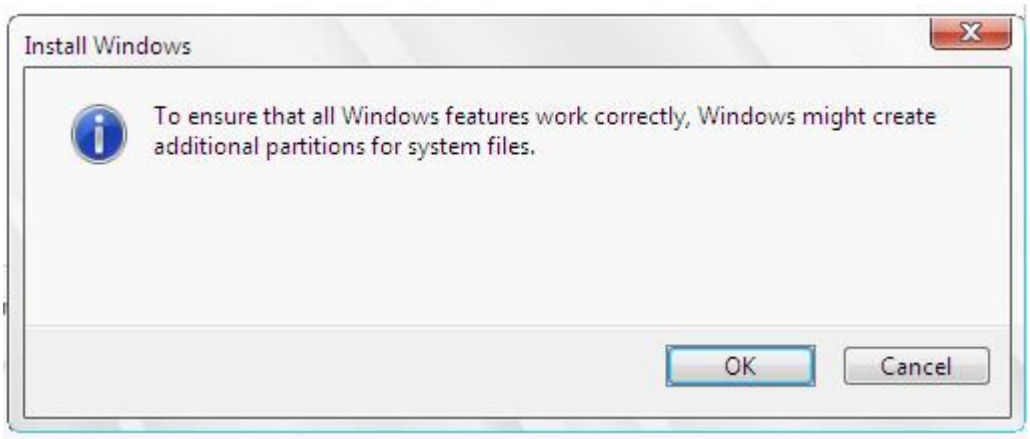

Install Windows
Which type of installation do you want?
Upgrade
Upgrade to a newer version of Windows and keep your files, settings, and programs. The option to upgrade is only available when an existing version of Windows is running. We recommend backing up your files before you proceed.
Custom (advanced)
Install a new copy of Windows. This option does not keep your files, settings, and programs. The option to make changes to disks and partitions is available when you start your computer using the installation disc. We recommend backing up your files before you proceed.
Help me decide

We then select the unformatted drive and click Drive options (advanced).

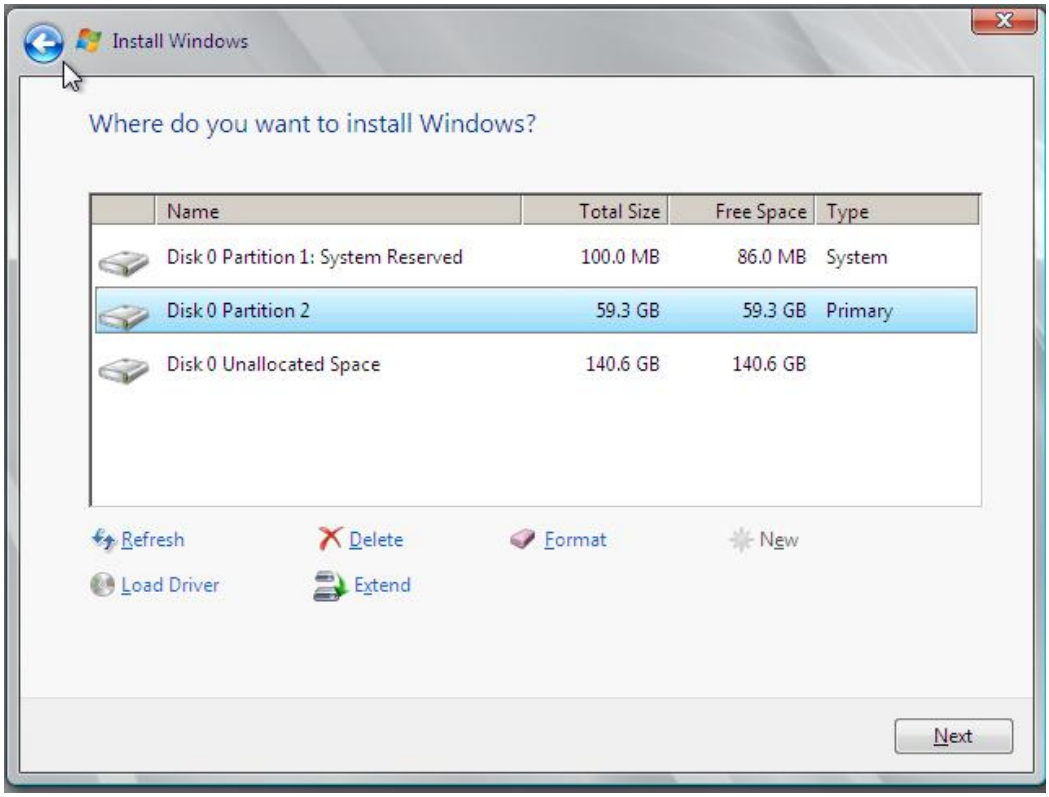


We then click New, and enter 60820MB as the partition size. The brief specified partition size is 60GB, to which we add 100MB to accommodate the separate partition that Windows creates for system files.

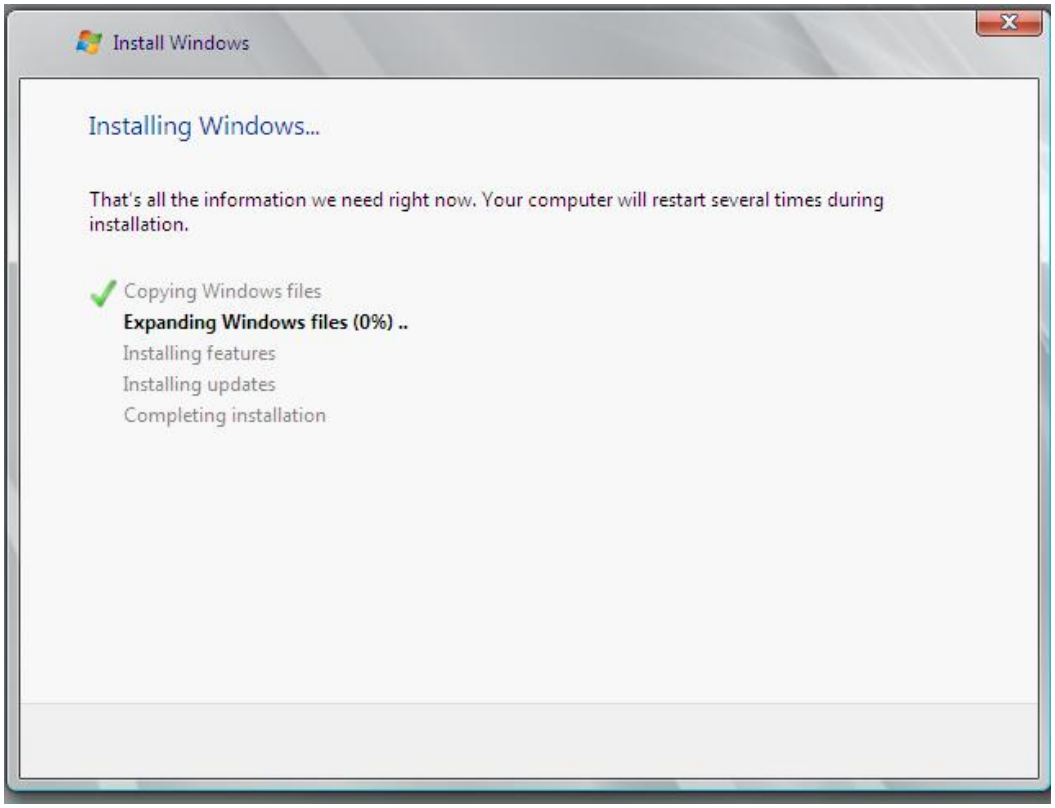



Install Windows
To ensure that all Windows features work correctly, Windows might create additional partitions for system files.
OK
Cancel

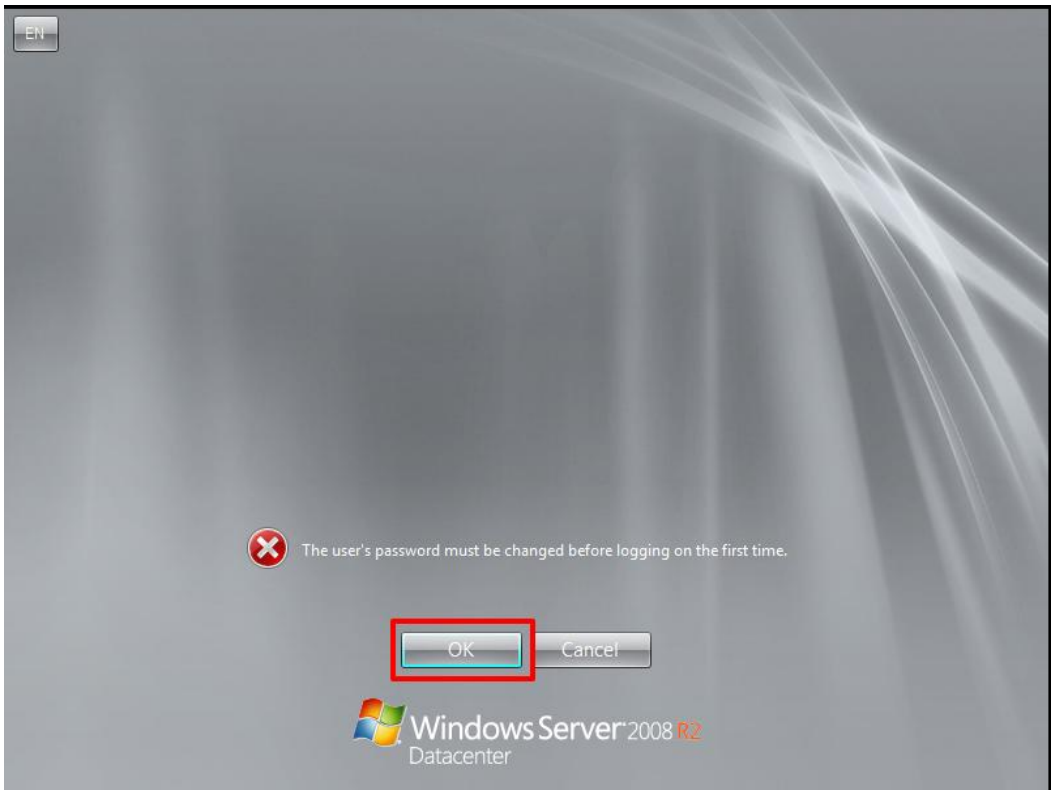
The next window shows the partitions that have been created, we select the 60GB partition as the location to install Windows, and click Next to proceed with the installation.



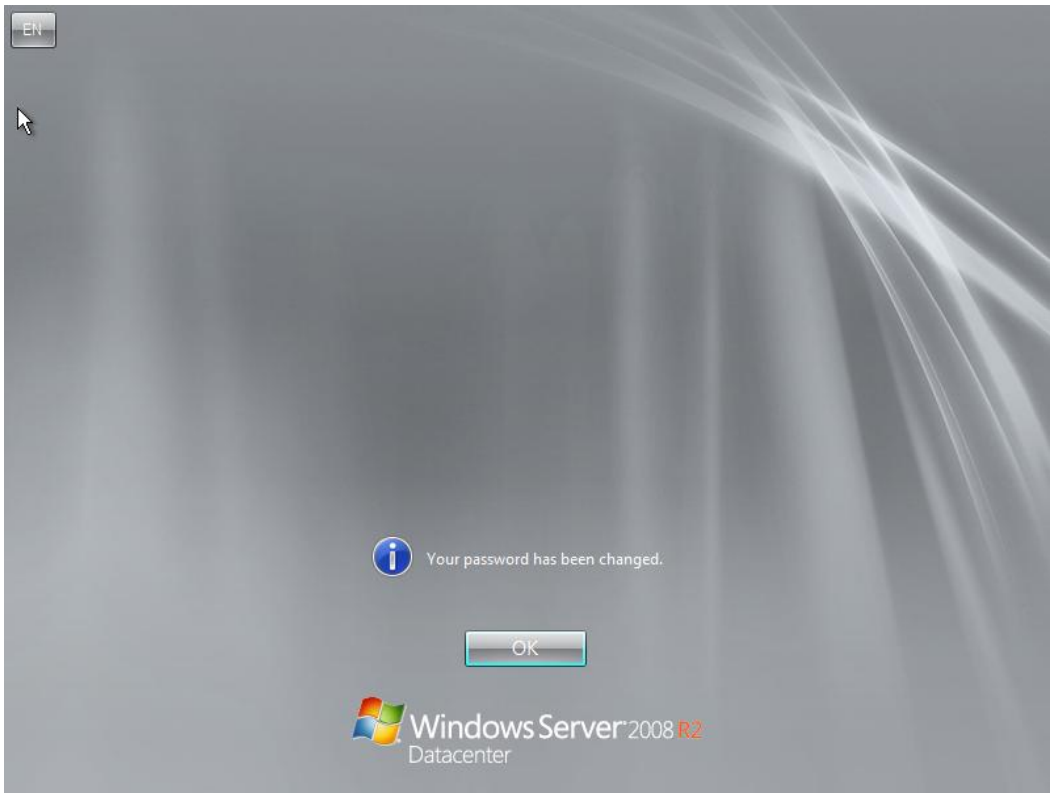
The installation then commences.


Install Windows
Installing Windows...
That's all the information we need right now. Your computer will restart several times during installation.
Copying Windows files
Expanding Windows files (0%) ..
Installing features
Installing updates
Completing installation

Once the installation has completed we are required to create the Administrator password.



We set the password as Pa$$w0rd as specified in the assignment brief.



4.3.2 Subtask 2 - Create Client Machine with Windows 7

The assignment brief requires us to create a client machine with Windows 7 or later installed named Client1, which is to be cloned and renamed as Client2.

The creation of the client VM is as described in Appendix D hereunder, including an installation of windows 7 professional.

In order to minimise resources used by the virtual machines, and to provide redundancy in the event of failure of any of the VMs, we will create linked clones of all of our VMs.

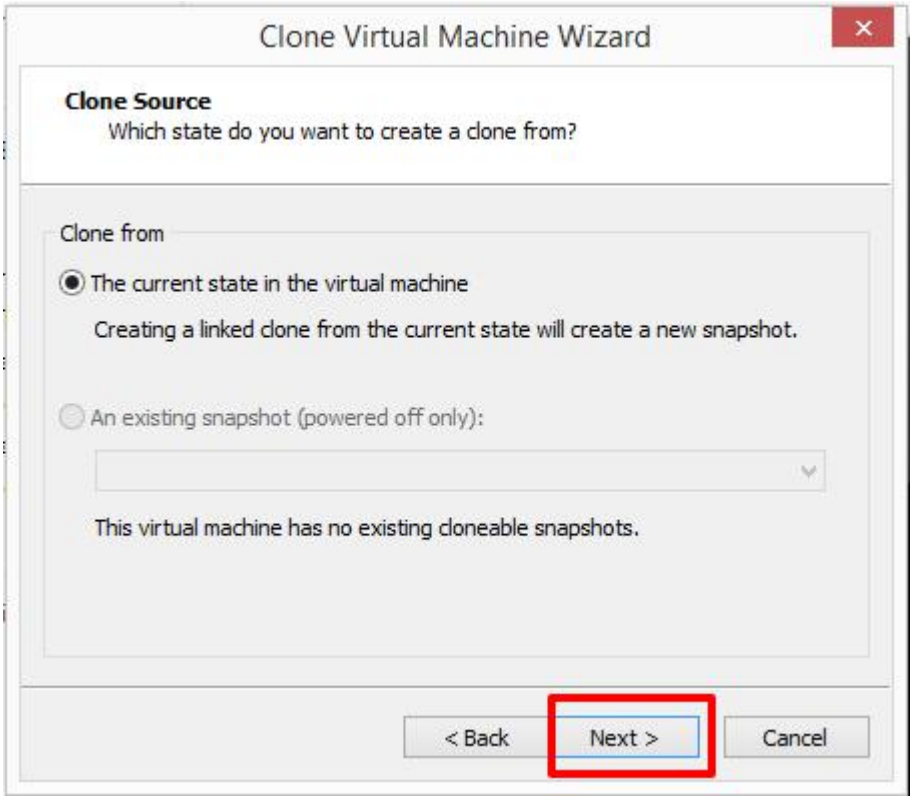
Linked clones allow us to install an operating system once and make copies of it, whereby the OS that is being cloned is used as a base image, and the cloned VM uses the base image when it is powered on. This means that the cloned VM uses significantly less space as it does not need the initial OS space that a newly created VM normally uses.

The description hereunder is of the cloning of our Server1 VM, and can be applied for the cloning of the other VMs.

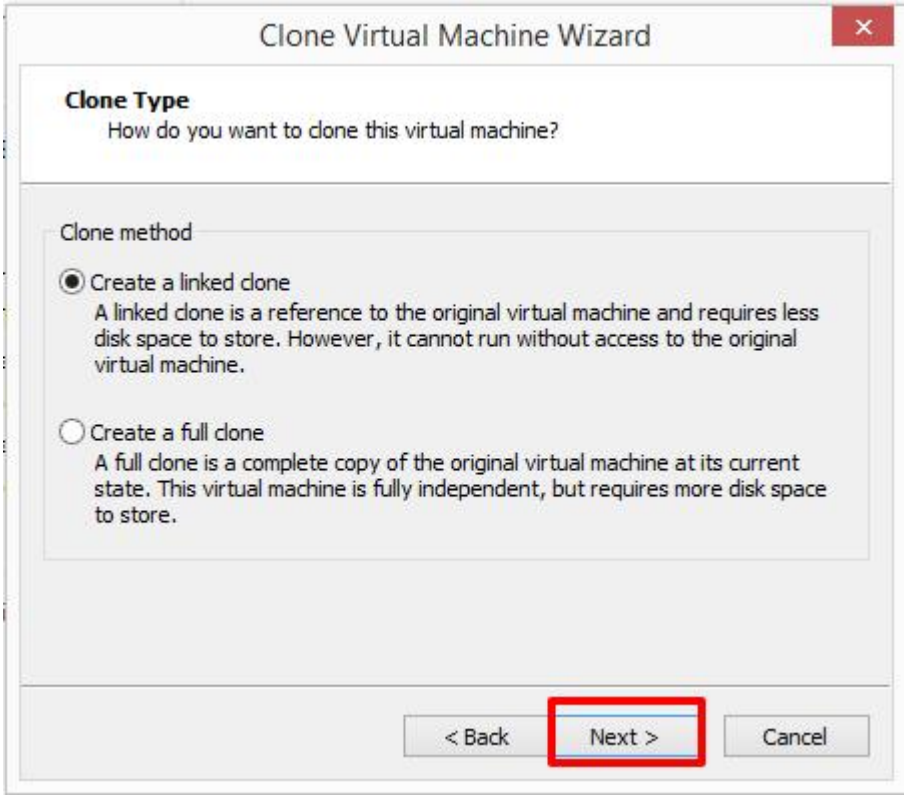
4.3.2.1 Step 1

From the VMWare Workstation library we right click on the VM we wish to clone, select Manage and click Clone, to open the Clone Virtual Machine Wizard, which we follow as shown.

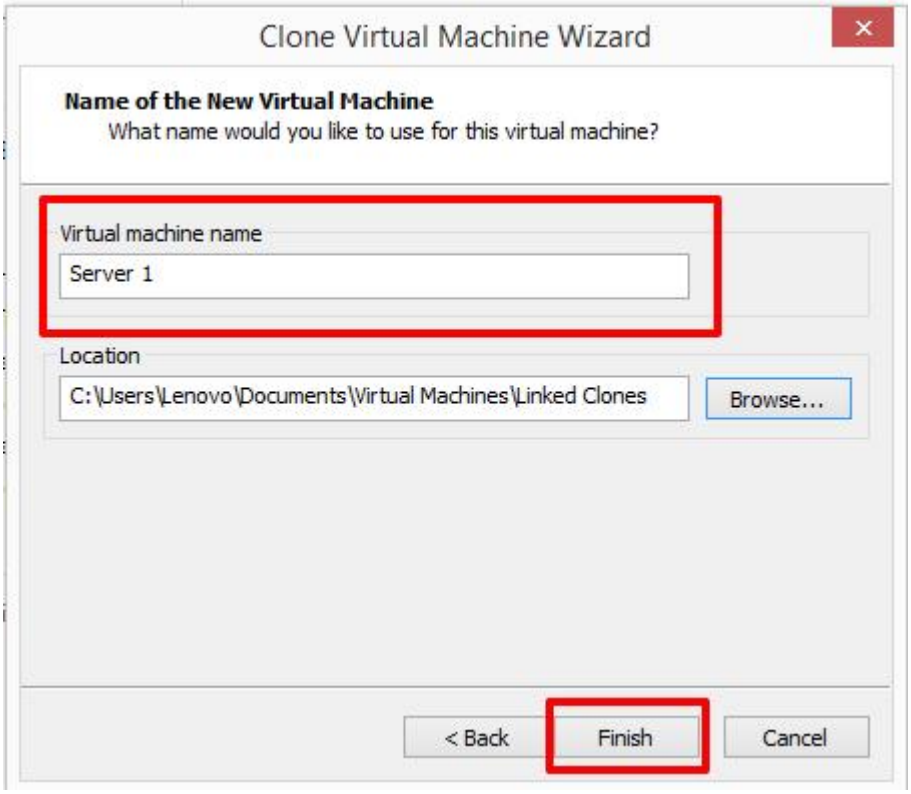
Clone Virtual Machine Wizard
Welcome to the Clone Virtual Machine Wizard
This wizard will help you create a copy of this virtual machine.
If you intend for other users to create clones from this virtual machine, you should enable template mode under VM > Settings > Options > Advanced.
VMware
Workstation 9
< Back
Next >
Cancel

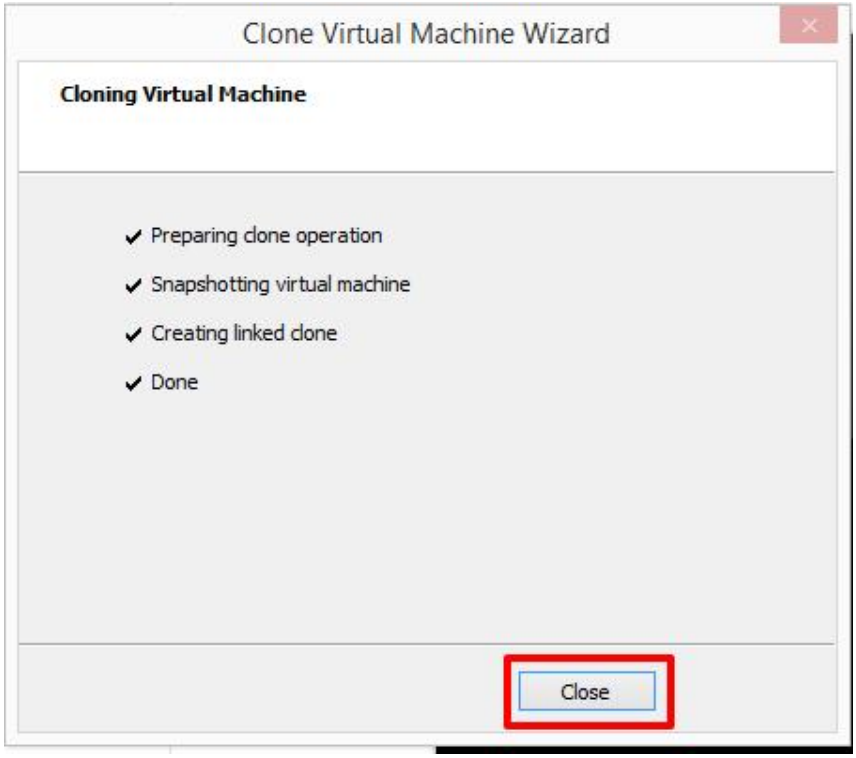

Clone Virtual Machine Wizard
Clone Source
Which state do you want to create a clone from?
Clone from
The current state in the virtual machine
Creating a linked clone from the current state will create a new snapshot.
An existing snapshot (powered off only):
This virtual machine has no existing cloneable snapshots.
< Back
Next >
Cancel

We select the Create a linked clone radio button.


Clone Virtual Machine Wizard
Clone Type
How do you want to clone this virtual machine?
Clone method
Create a linked clone
A linked clone is a reference to the original virtual machine and requires less disk space to store. However, it cannot run without access to the original virtual machine.
Create a full clone
A full clone is a complete copy of the original virtual machine at its current state. This virtual machine is fully independent, but requires more disk space to store.
< Back
Next >
Cancel

We then name the clone and chose the location for the VM's file.

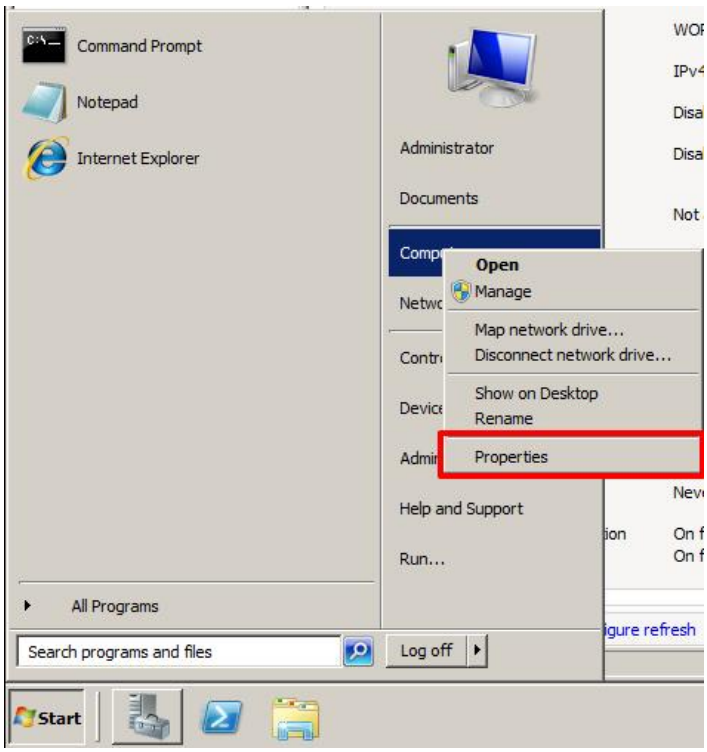




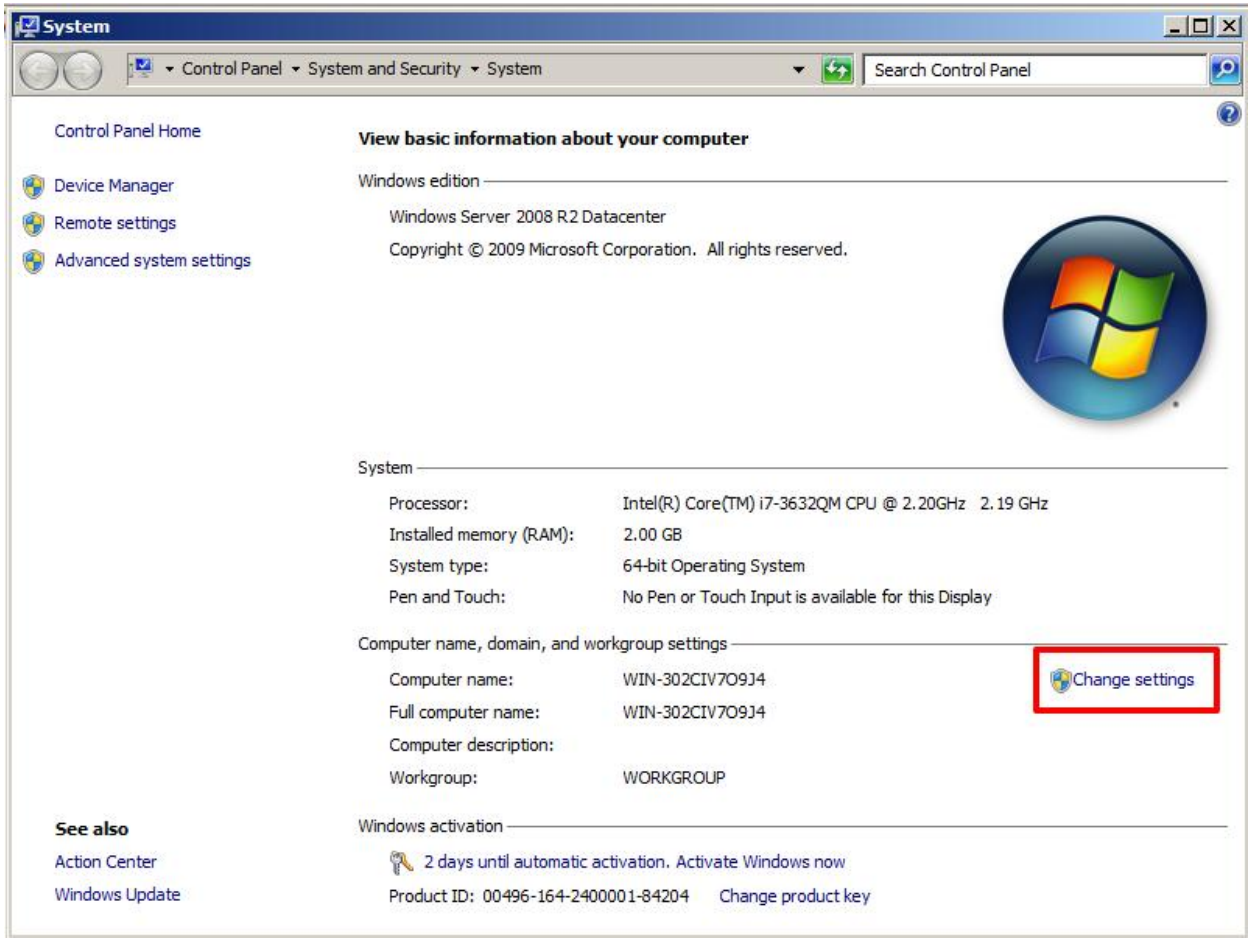
4.3.3 Subtask 3 - Computer Names

4.3.3.1 Step 1 - Rename Server 1 and Server 2 Machines

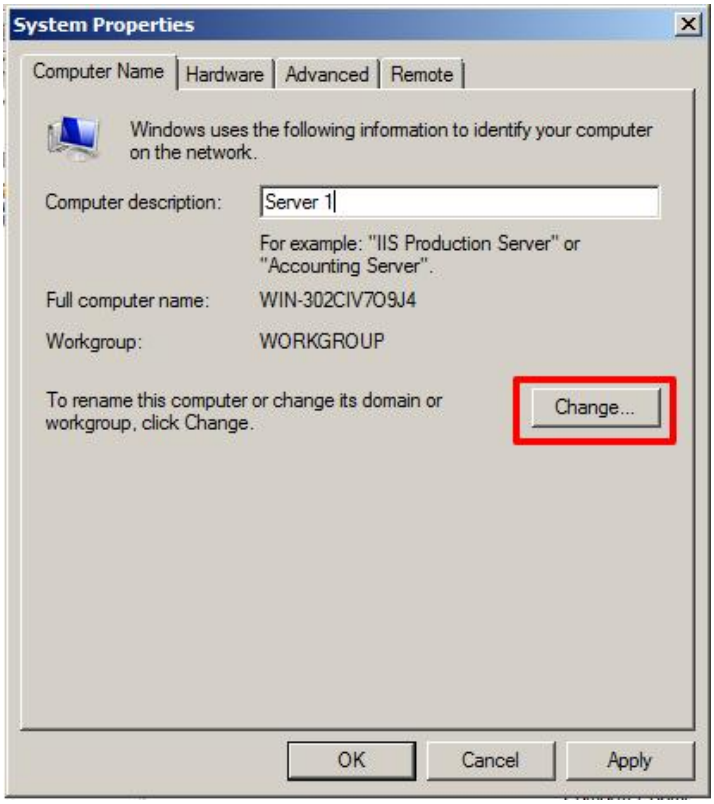
From the start menu we right click on Computer and click Properties



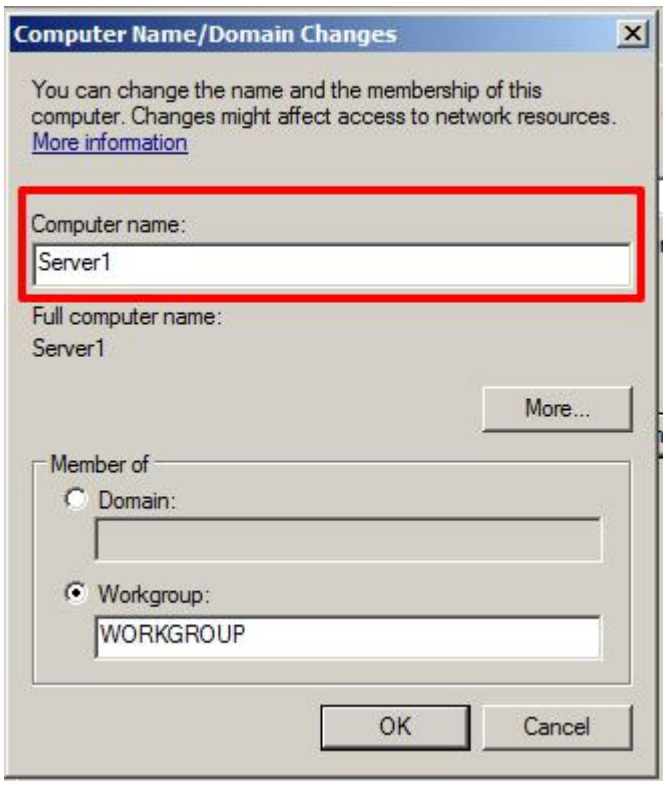
From the System window we click Change settings


System
Control Panel ▸ System and Security ▸ System
Search Control Panel
Control Panel Home
Device Manager
Remote settings
Advanced system settings
View basic information about your computer
Windows edition
Windows Server 2008 R2 Datacenter
Copyright © 2009 Microsoft Corporation. All rights reserved.
System
Processor: Intel(R) Core(TM) i7-3632QM CPU @ 2.20GHz 2.19 GHz
Installed memory (RAM): 2.00 GB
System type: 64-bit Operating System
Pen and Touch: No Pen or Touch Input is available for this Display
Computer name, domain, and workgroup settings
Computer name: WIN-302CIV7O9J4
Full computer name: WIN-302CIV7O9J4
Computer description:
Workgroup: WORKGROUP
Change settings
See also
Action Center
Windows Update
Windows activation
2 days until automatic activation. Activate Windows now
Product ID: 00496-164-2400001-84204
Change product key

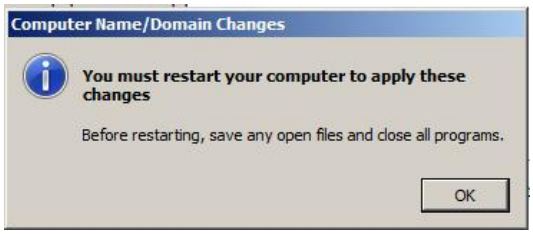
On the System Properties window we open the Computer Name tab and click Change.



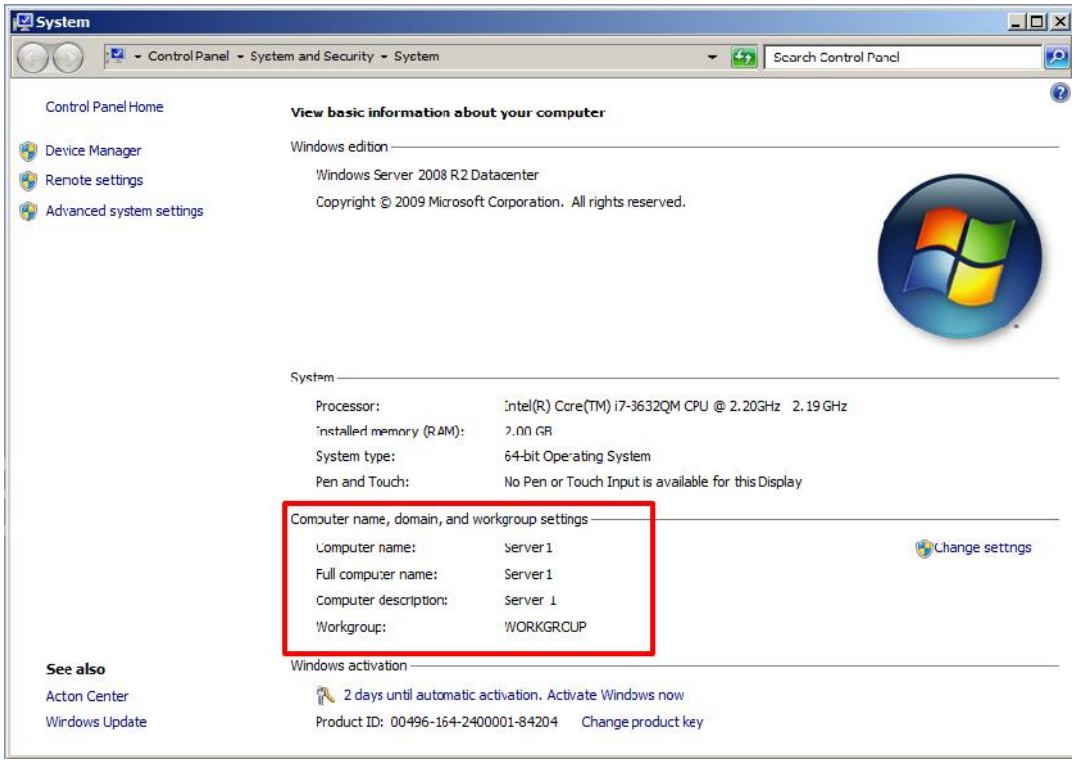
We then enter the computer name as applies.

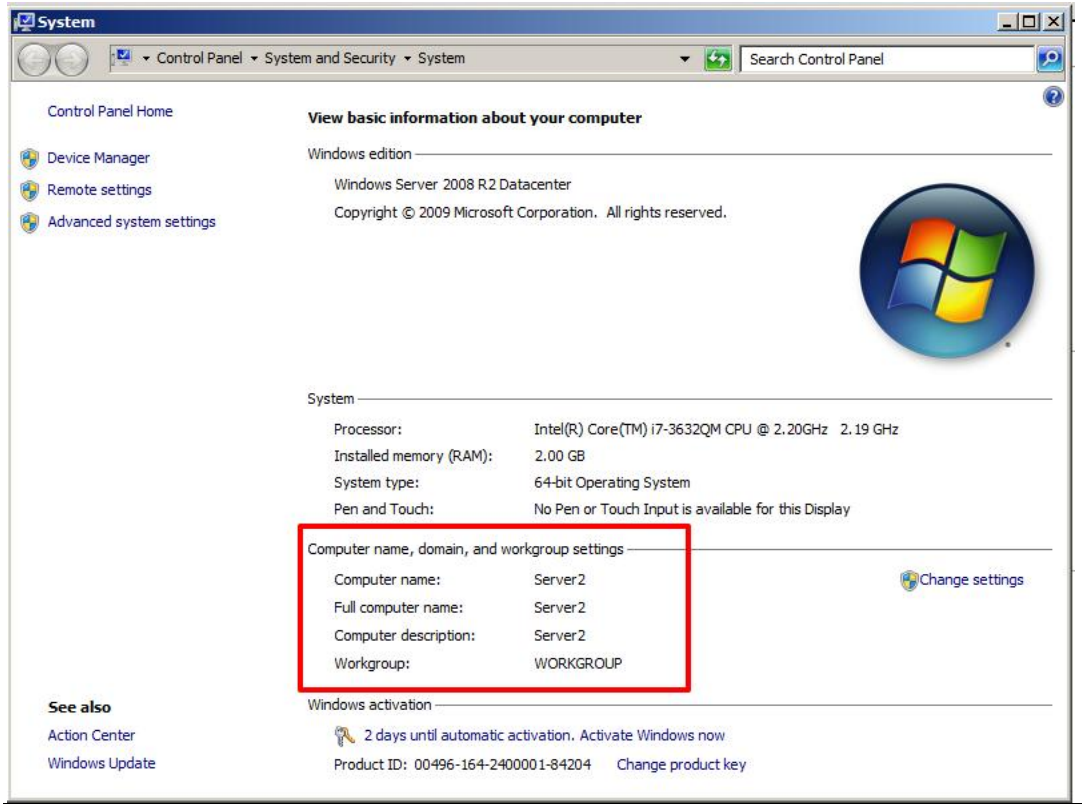


It is necessary to restart the computer to apply the computer name change.


Computer Name/Domain Changes
You must restart your computer to apply these changes
Before restarting, save any open files and close all programs.
OK

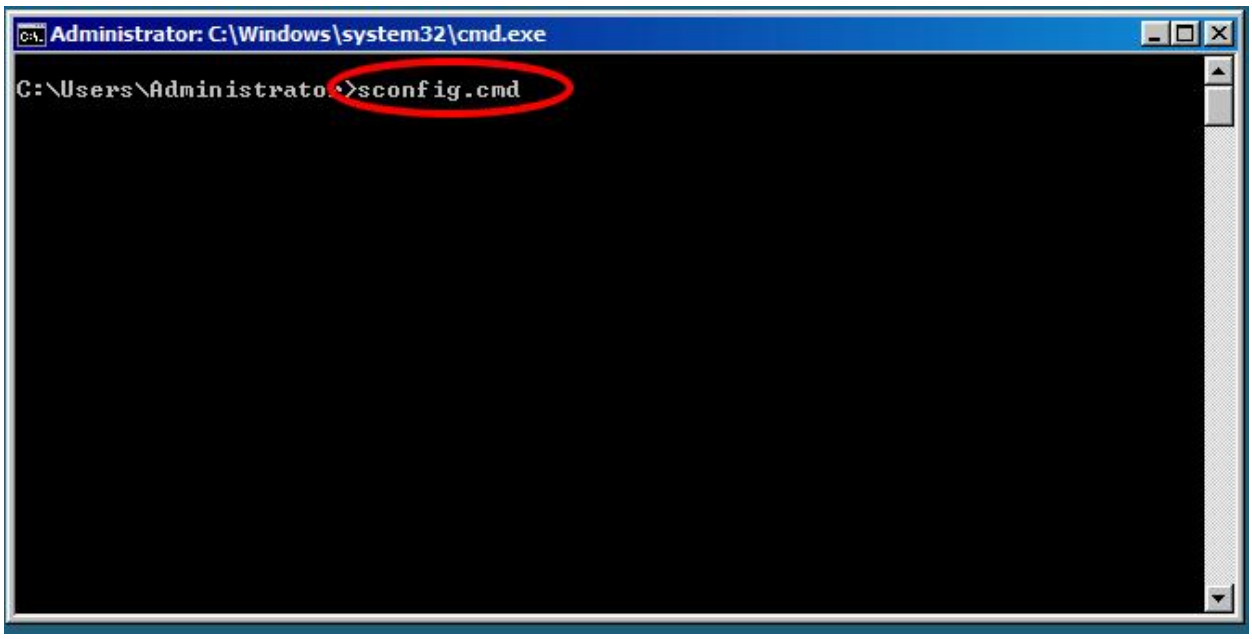
Once complete, we can see the required names for Server1 and Server 2.


System
Control Panel ▸ System and Security ▸ System
Search Control Panel
Control Panel Home
Device Manager
Remote settings
Advanced system settings
View basic information about your computer
Windows edition
Windows Server 2008 R2 Datacenter
Copyright © 2009 Microsoft Corporation. All rights reserved.
System
Processor: Intel(R) Ccre(TM) i7-3632QM CPU @ 2.20GHz 2.19 GHz
Installed memory (RAM): 2.00 GB
System type: 64-bit Operating System
Pen and Touch: No Pen or Touch Input is available for this Display
Computer name, domain, and workgroup settings
Computer name: Server1
Full computer name: Server1
Computer description: Server 1
Workgroup: WORKGROUP
Change settings
See also
Acton Center
Wirdows Update
Windows activation
2 days until automatic activation. Activate Windows now
Product ID: 00496-164-2400001-84204 Change product key

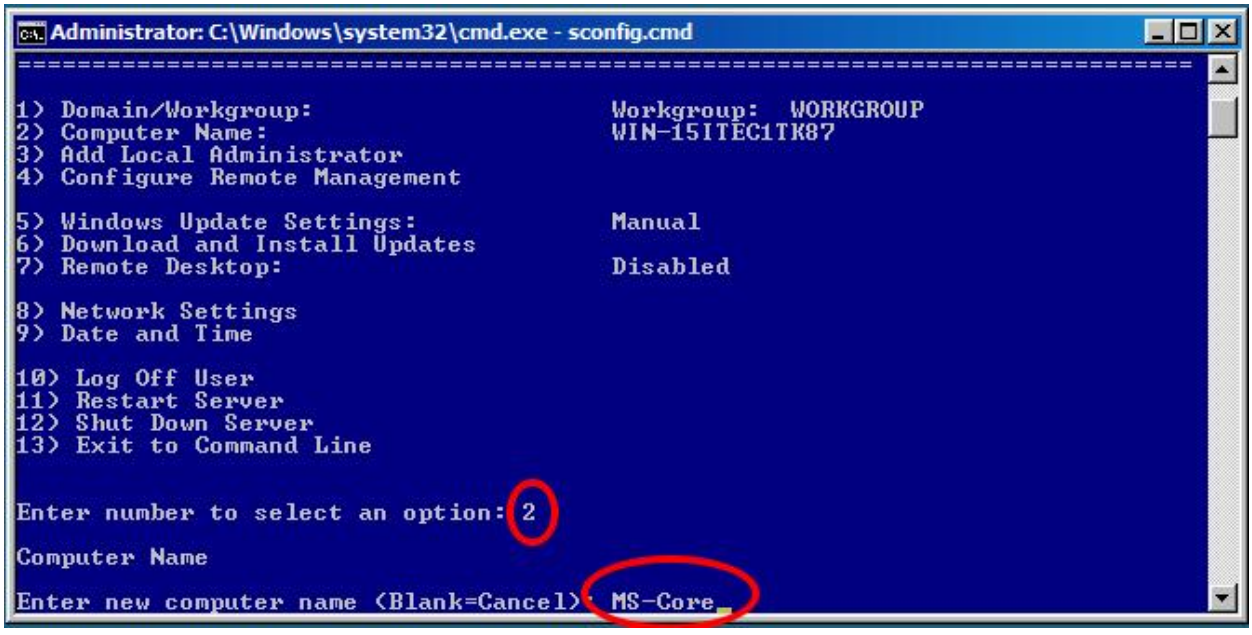

System
Control Panel ▸ System and Security ▸ System
Search Control Panel
Control Panel Home
Device Manager
Remote settings
Advanced system settings
View basic information about your computer
Windows edition
Windows Server 2008 R2 Datacenter
Copyright © 2009 Microsoft Corporation. All rights reserved.
System
Processor: Intel(R) Core(TM) i7-3632QM CPU @ 2.20GHz 2.19 GHz
Installed memory (RAM): 2.00 GB
System type: 64-bit Operating System
Pen and Touch: No Pen or Touch Input is available for this Display
Computer name, domain, and workgroup settings
Computer name: Server2
Full computer name: Server2
Computer description: Server2
Workgroup: WORKGROUP
Change settings
See also
Action Center
Windows Update
Windows activation
2 days until automatic activation. Activate Windows now
Product ID: 00496-164-2400001-84204 Change product key

4.3.3.2 Step 2 - Rename MS-Core Machine

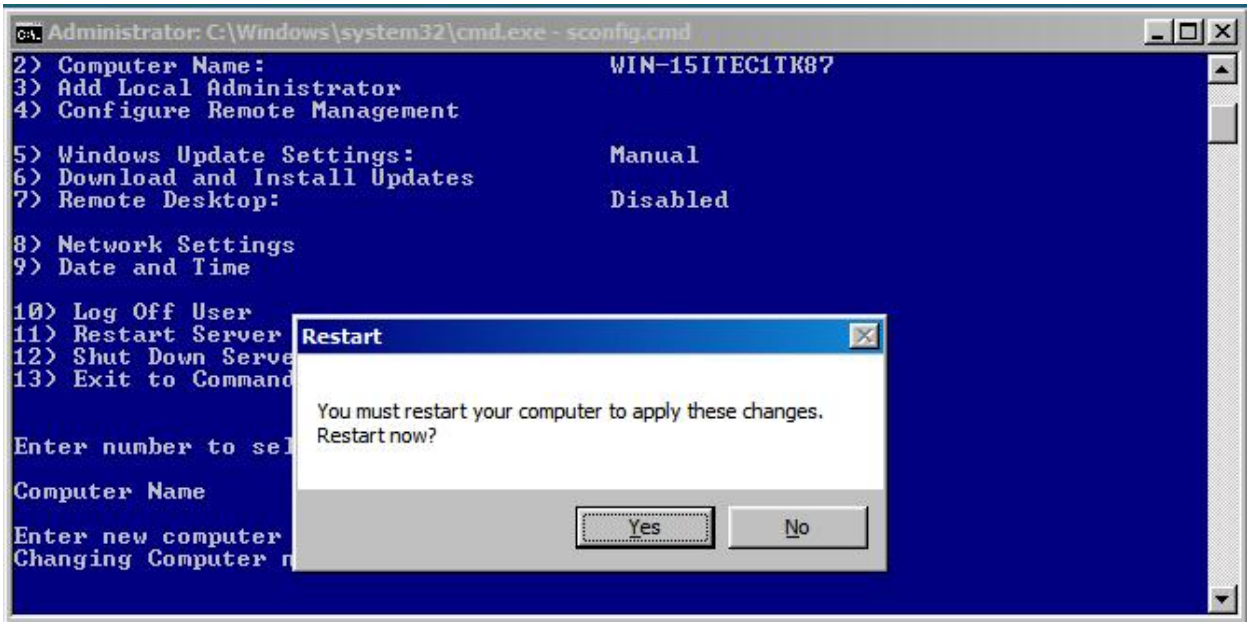
To change the name of the Server Core machine, we enter 'sconfig.cmd' from the command prompt.



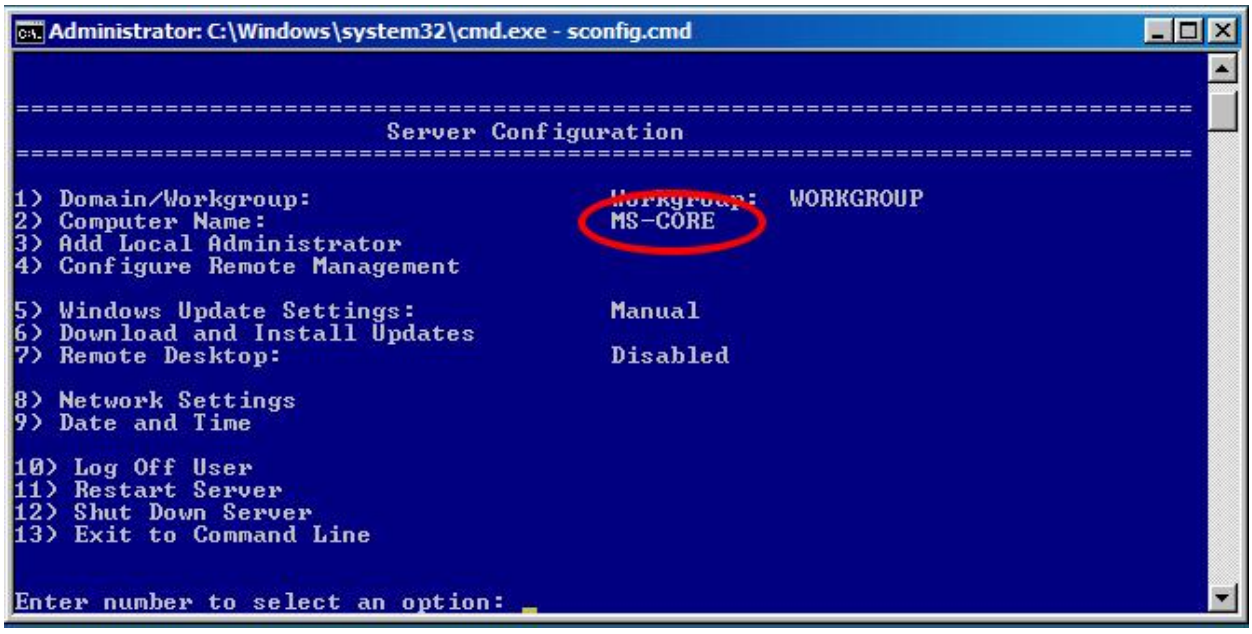
This opens the server configuration interface, where we enter '2' for Computer Name, which allows us to enter the name we want for the computer.


Administrator: C:\Windows\system32\cmd.exe - sconfig.cmd
1) Domain/Workgroup: Workgroup: WORKGROUP
2) Computer Name: WIN-15ITEC1TK87
3) Add Local Administrator
4) Configure Remote Management
5) Windows Update Settings: Manual
6) Download and Install Updates
7) Remote Desktop: Disabled
8) Network Settings
9) Date and Time
10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line
Enter number to select an option: 2
Computer Name
Enter new computer name (Blank=Cancel): MS-Core

We are prompted to restart the computer to apply the changes.

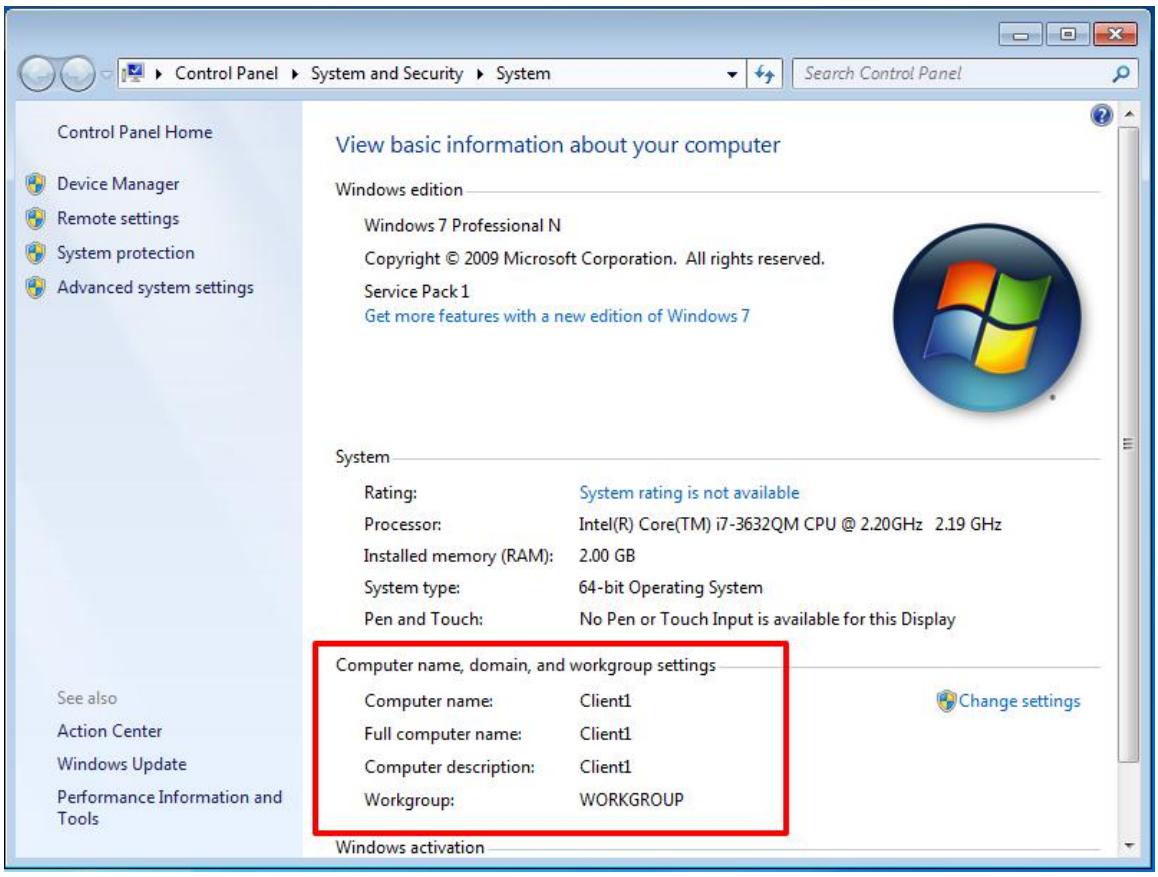


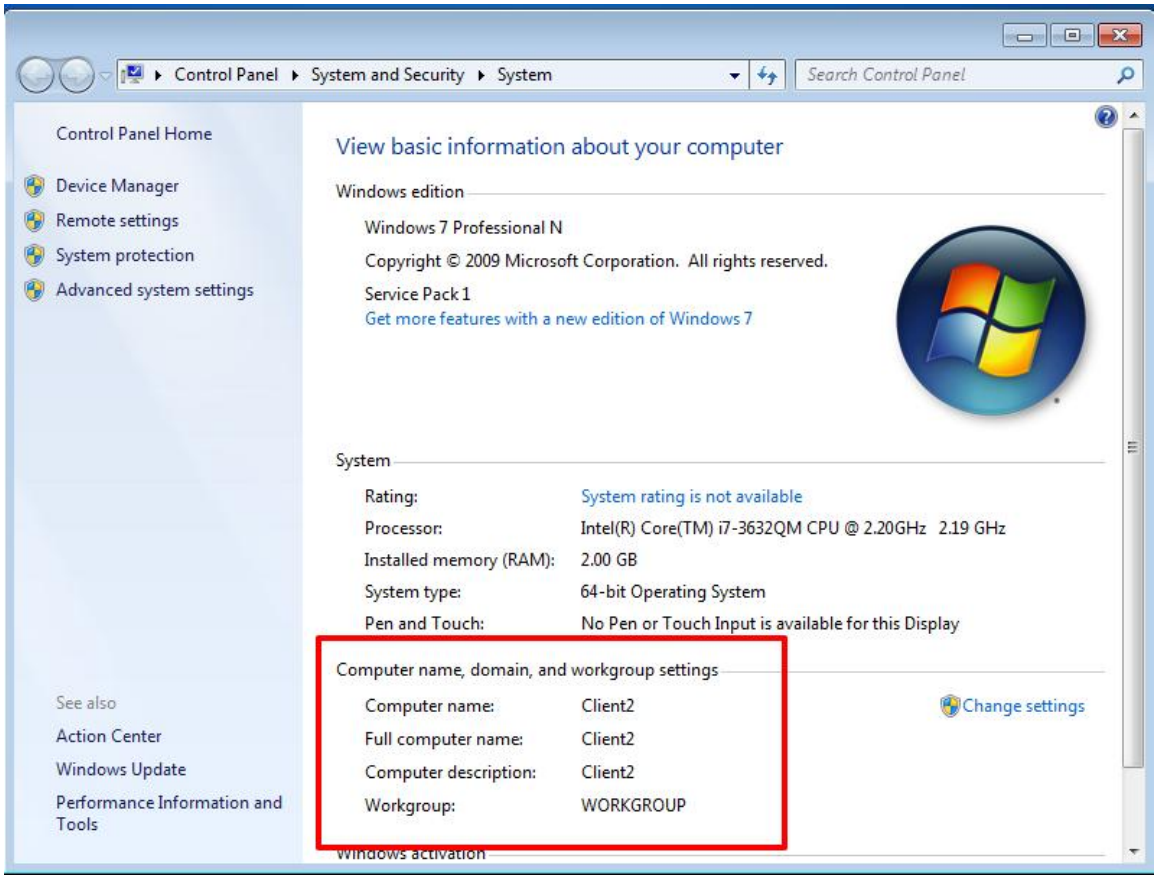
Once the computer has restarted, by entering Server Configuration again we can see that the computer name has been changed as required.


Administrator: C:\Windows\system32\cmd.exe - sconfig.cmd
Server Configuration
1) Domain/Workgroup: Workgroup: WORKGROUP
2) Computer Name: MS-CORE
3) Add Local Administrator
4) Configure Remote Management
5) Windows Update Settings: Manual
6) Download and Install Updates
7) Remote Desktop: Disabled
8) Network Settings
9) Date and Time
10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line
Enter number to select an option:

4.3.3.3 Step 3 - Rename Client 1 and Client 2 Machines

The same procedure as described above for renaming Server1 and Server2 is followed to rename the two client machines.


Control Panel ▸ System and Security ▸ System
Search Control Panel
Control Panel Home
Device Manager
Remote settings
System protection
Advanced system settings
View basic information about your computer
Windows edition
Windows 7 Professional N
Copyright © 2009 Microsoft Corporation. All rights reserved.
Service Pack 1
Get more features with a new edition of Windows 7
System
Rating: System rating is not available
Processor: Intel(R) Core(TM) i7-3632QM CPU @ 2.20GHz 2.19 GHz
Installed memory (RAM): 2.00 GB
System type: 64-bit Operating System
Pen and Touch: No Pen or Touch Input is available for this Display
Computer name, domain, and workgroup settings
Computer name: Client1
Full computer name: Client1
Computer description: Client1
Workgroup: WORKGROUP
Change settings
See also
Action Center
Windows Update
Performance Information and Tools
Windows activation


Control Panel ▸ System and Security ▸ System
Search Control Panel
Control Panel Home
Device Manager
Remote settings
System protection
Advanced system settings
View basic information about your computer
Windows edition
Windows 7 Professional N
Copyright © 2009 Microsoft Corporation. All rights reserved.
Service Pack 1
Get more features with a new edition of Windows 7
System
Rating: System rating is not available
Processor: Intel(R) Core(TM) i7-3632QM CPU @ 2.20GHz 2.19 GHz
Installed memory (RAM): 2.00 GB
System type: 64-bit Operating System
Pen and Touch: No Pen or Touch Input is available for this Display
Computer name, domain, and workgroup settings
Computer name: Client2
Full computer name: Client2
Computer description: Client2
Workgroup: WORKGROUP
Change settings
See also
Action Center
Windows Update
Performance Information and Tools
Windows activation

4.3.4 Subtask 4 - Assign Static IP Addresses to all Machines

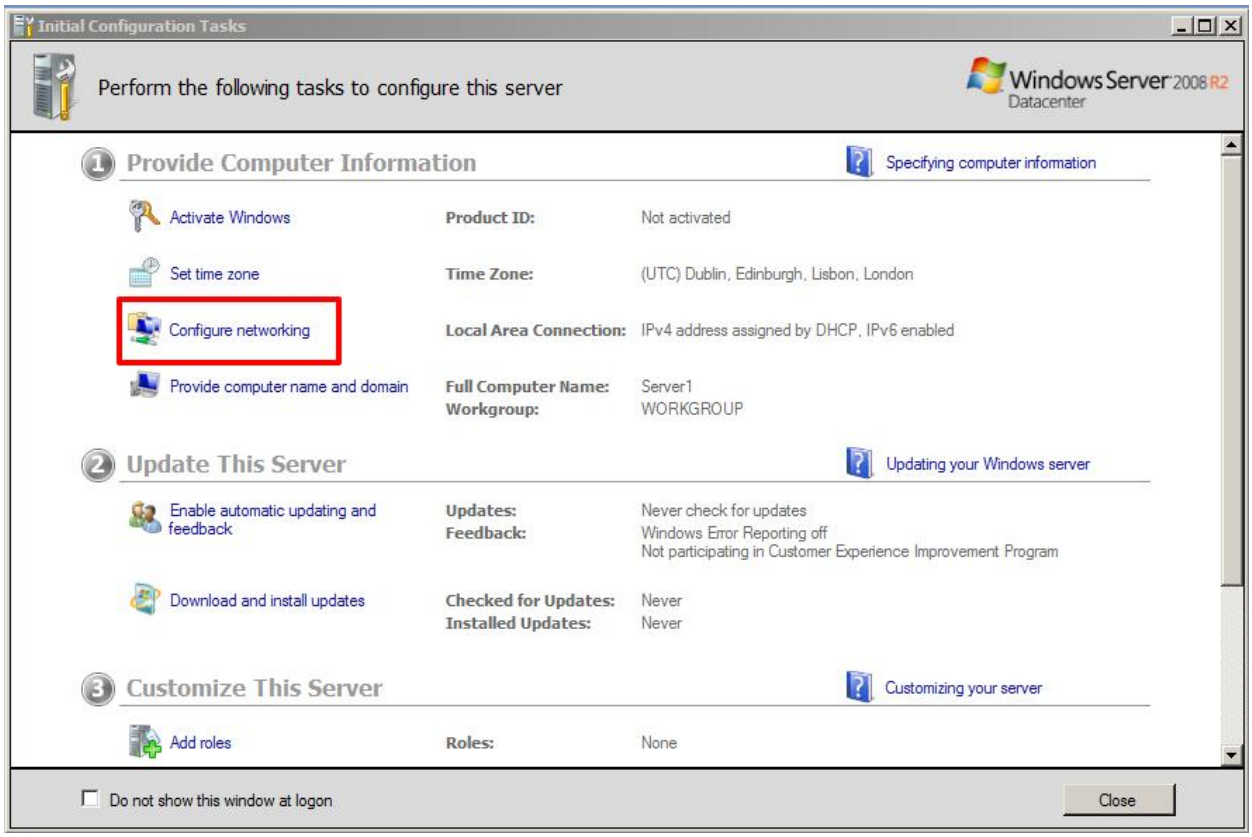
When we need a computer to always use a specific IP address, such as a server, it is necessary to assign it a static IP address.

By default, TCP/IP settings are configured to for nodes on a network to receive an address automatically from a Dynamic Host Configuration Protocol (DHCP) server on the network, and it is not necessary to manually configure TCP/IP settings. However automatically assigned IP addresses are subject to change, and so, in order to ensure reliable communication between nodes on a network we use static IP addresses.

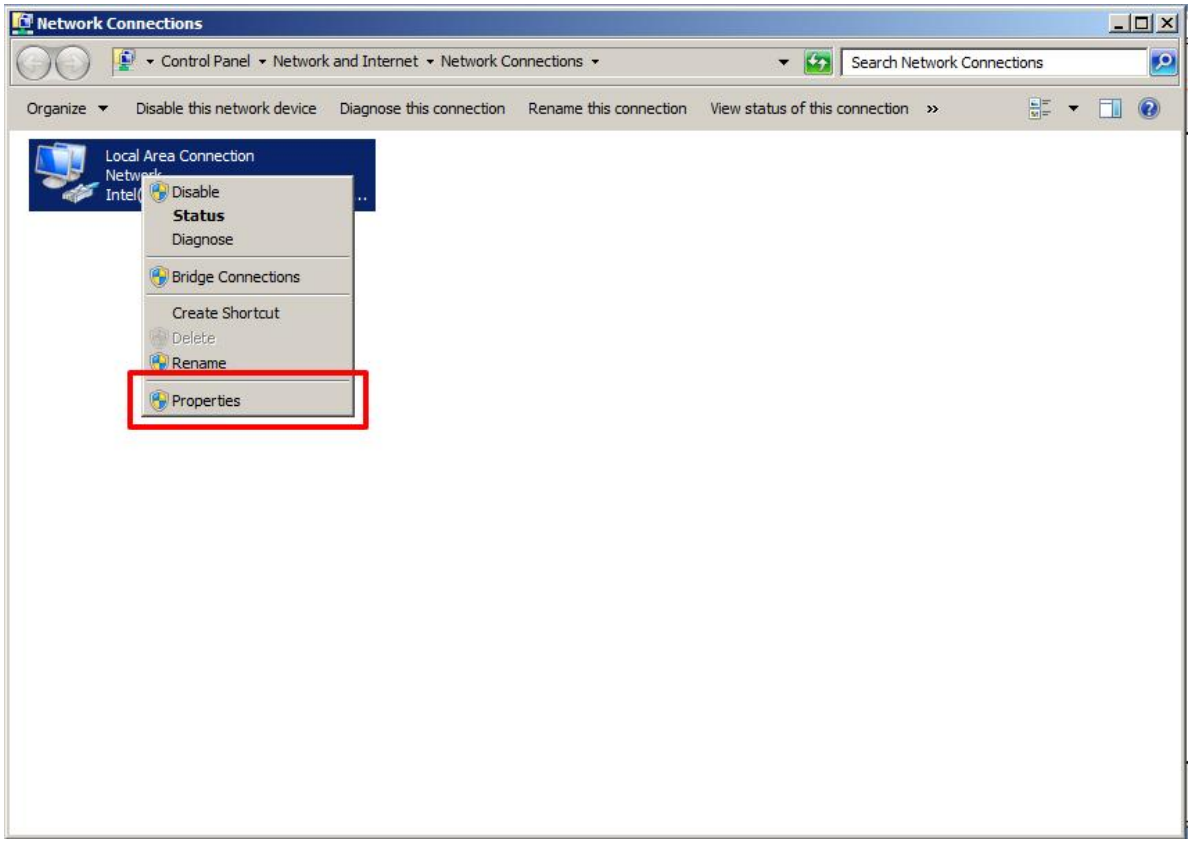
In order to assign a static IP address we must fist ensure that the address we wish to assign is not in the DHCP range of addresses that may be automatically assigned , and avoid the risk of an IP address being assigned statically and dynaically. IP address conflict will also ensue if we attempt to assign an IP address that has already been assigned to another computer.

4.3.4.1 Step 1 - Assign Static IP Addresses to Server1 and Server2

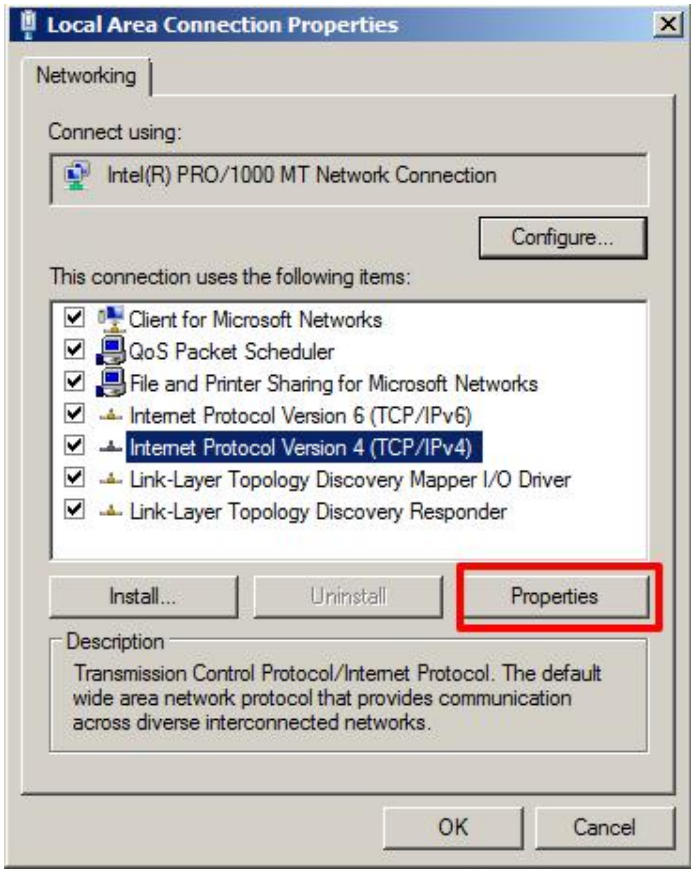
To statically assign an IP address on either of our Windows Server 2008 R" Datacentre (Full Installation) machines we firstly select Configure networking from the Initial Configuration Tasks window. Alternatively we can search for View Network Connections from the start menu to open the same window, and this is how the window is accessed from our windows 7 client machines.


Initial Configuration Tasks
Perform the following tasks to configure this server
Windows Server 2008 R2 Datacenter
1 Provide Computer Information
Specifying computer information
Activate Windows
Product ID: Not activated
Set time zone
Time Zone: (UTC) Dublin, Edinburgh, Lisbon, London
Configure networking
Local Area Connection: IPv4 address assigned by DHCP, IPv6 enabled
Provide computer name and domain
Full Computer Name: Server1
Workgroup: WORKGROUP
2 Update This Server
Updating your Windows server
Enable automatic updating and feedback
Updates: Never check for updates
Feedback: Windows Error Reporting off
Not participating in Customer Experience Improvement Program
Download and install updates
Checked for Updates: Never
Installed Updates: Never
3 Customize This Server
Customizing your server
Add roles
Roles: None
Do not show this window at logon
Close

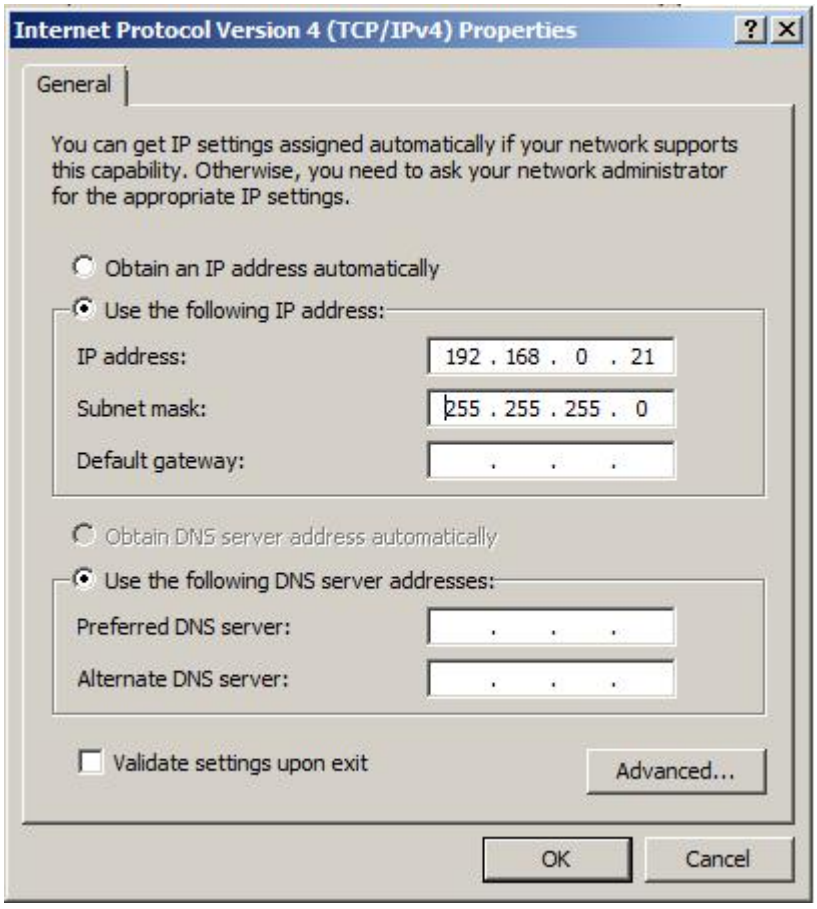
We right click on our Local Area Connection and select properties.



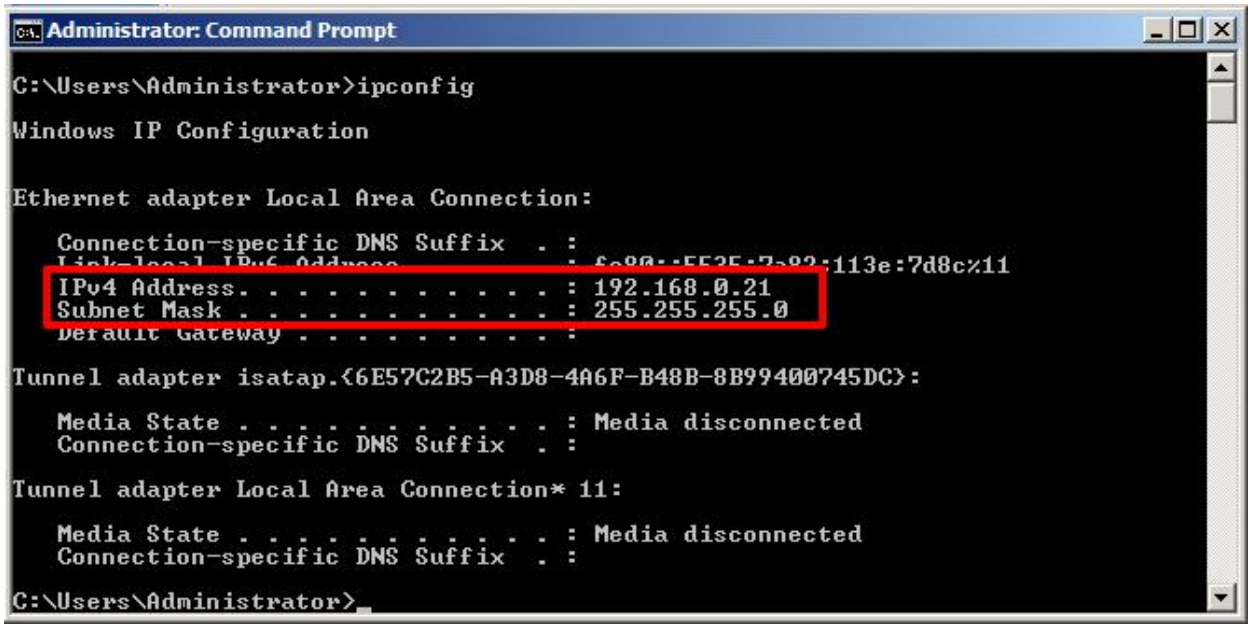
We then select the Internet Protocol Version 4 (TCP/IPv4) item and click Properties.



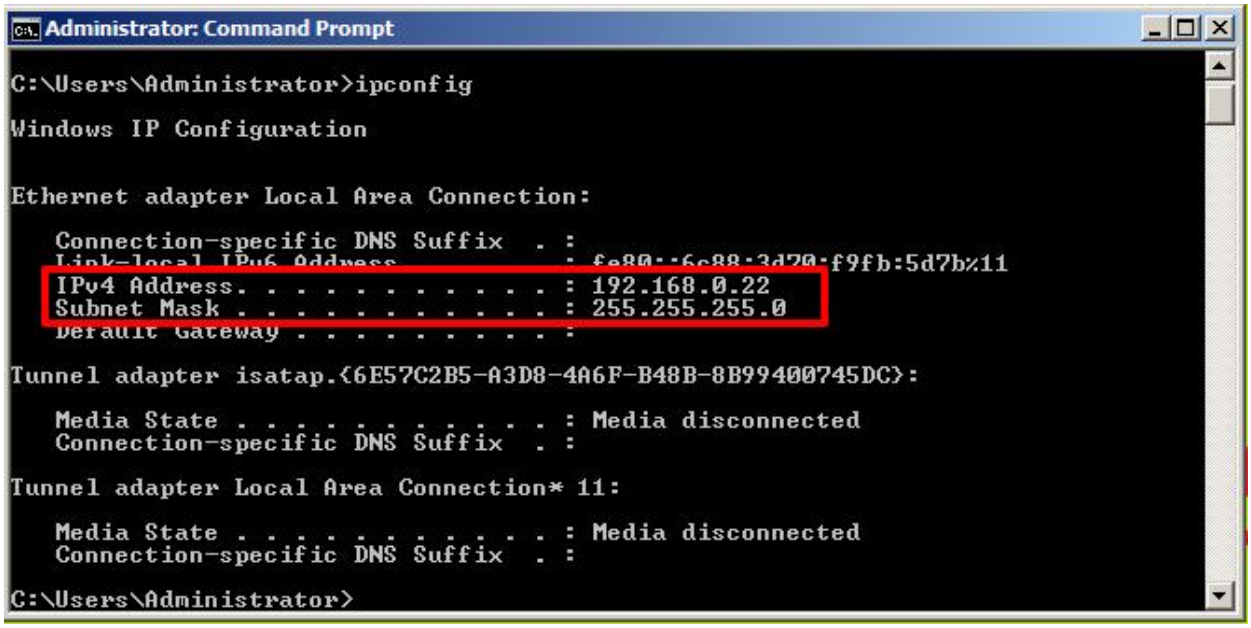
We then select the Use the following IP address radio button, which allows us to enter the IP address we wish to use for this machine, along with the Subnet mask. As we are using a private network there is no need to enter a default gateway address.


Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 0 . 21
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

From the command line on Server1 we type ipconfig to confirm that the IP address has been assigned successfully.


Administrator: Command Prompt
C:\Users\Administrator>ipconfig
Windows IP Configuration
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
IPv4 Address. . . . . : 192.168.0.21
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
Tunnel adapter isatap.{6E57C2B5-A3D8-4A6F-B48B-8B99400745DC}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Tunnel adapter Local Area Connection* 11:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
C:\Users\Administrator>

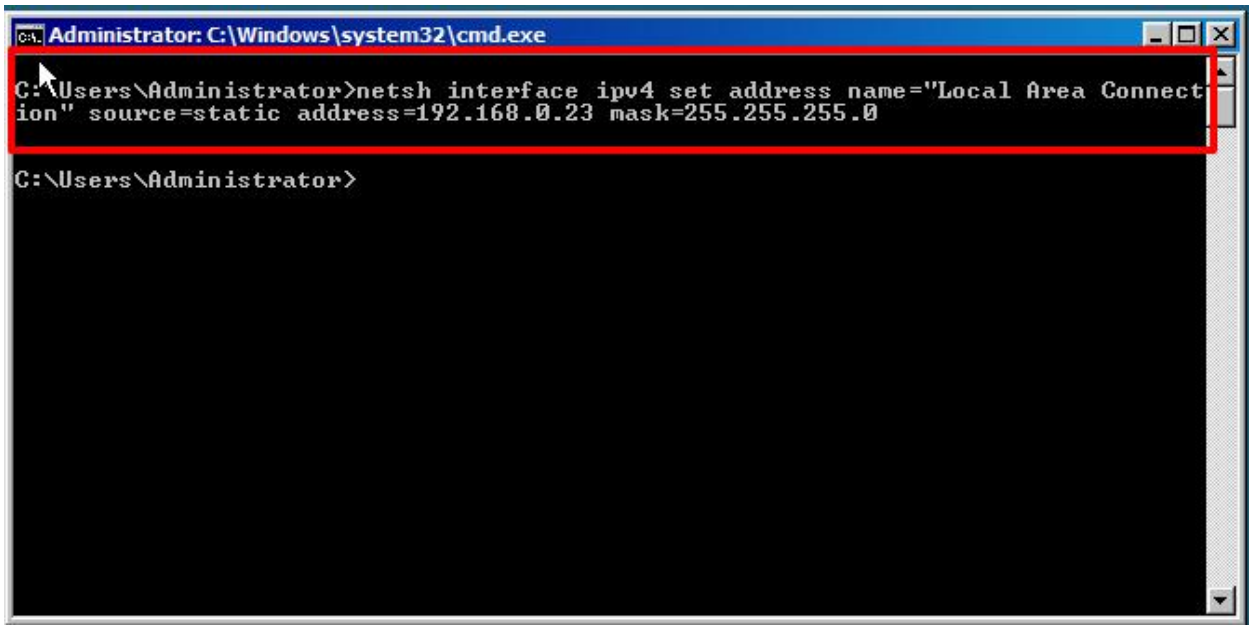
From the command line on Server2 we type ipconfig to confirm that the IP address has been assigned successfully.


Administrator: Command Prompt
C:\Users\Administrator>ipconfig
Windows IP Configuration
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
IPv4 Address. . . . . : 192.168.0.22
Subnet Mask . . . . . : 255.255.255.0
Tunnel adapter isatap.{6E57C2B5-A3D8-4A6F-B48B-8B99400745DC}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Tunnel adapter Local Area Connection* 11:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
C:\Users\Administrator>

4.3.4.2 Step 2 - Assign Static IP Addresses to MS-Core

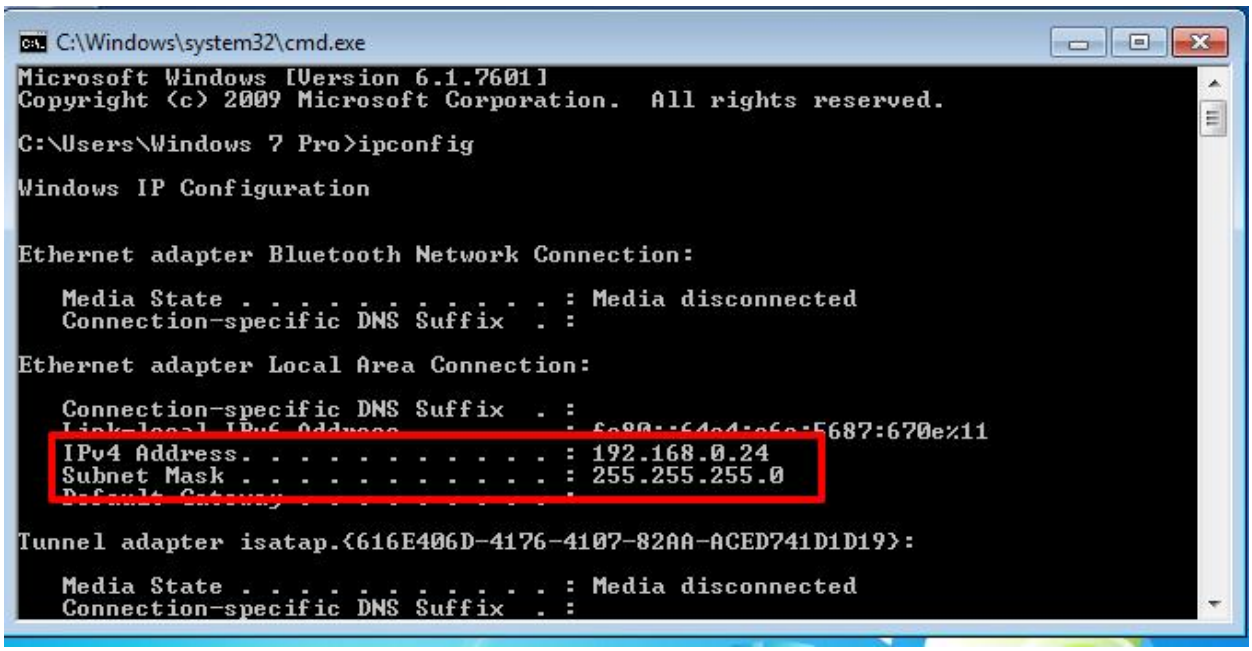
To assign a static IP address on our Windows Server 2008 R2 Datacentre (Core Server Installation) machine we use the netsh command from the command prompt, entering:

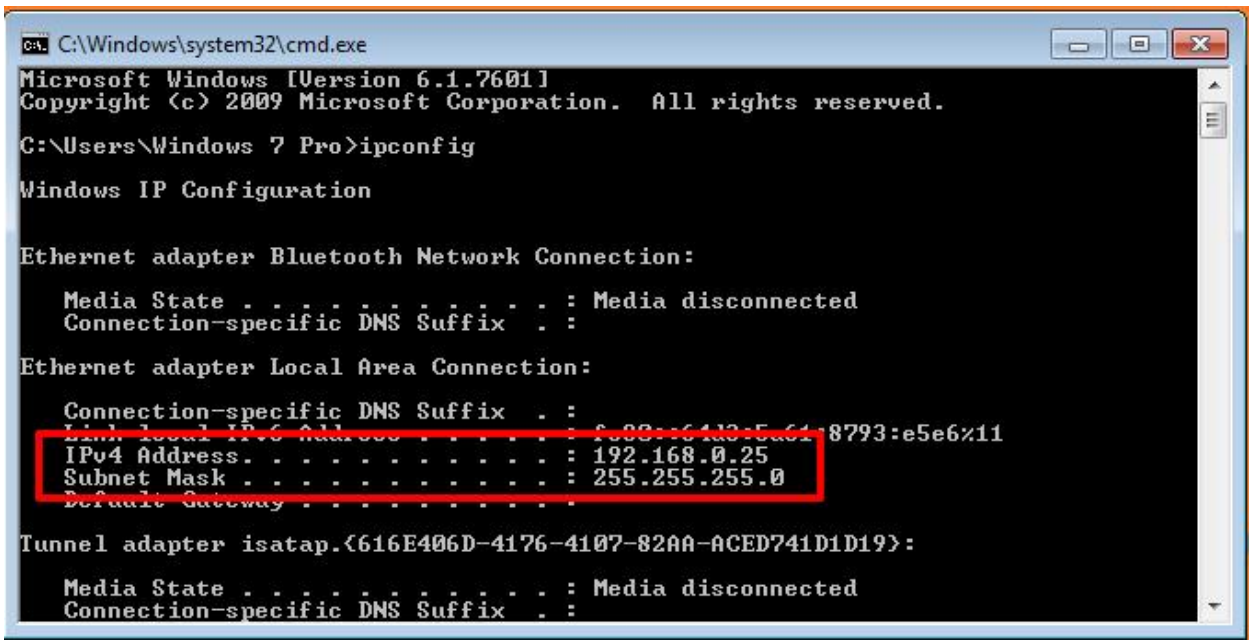
'netsh interface ipv4 set address name="Local Area Connection" source=static address=192.168.0.23 mask=255.255.255.0'


Administrator: C:\Windows\system32\cmd.exe
C:\Users\Administrator>netsh interface ipv4 set address name="Local Area Connection" source=static address=192.168.0.23 mask=255.255.255.0
C:\Users\Administrator>

4.3.4.3 Step 3 - Assign Static IP Addresses to Client Machines

We follow the same procedure as Step 1 above to assign static IP addresses to the client machines, and use ipconfig to confirm that the IP address has been assigned to each machine.

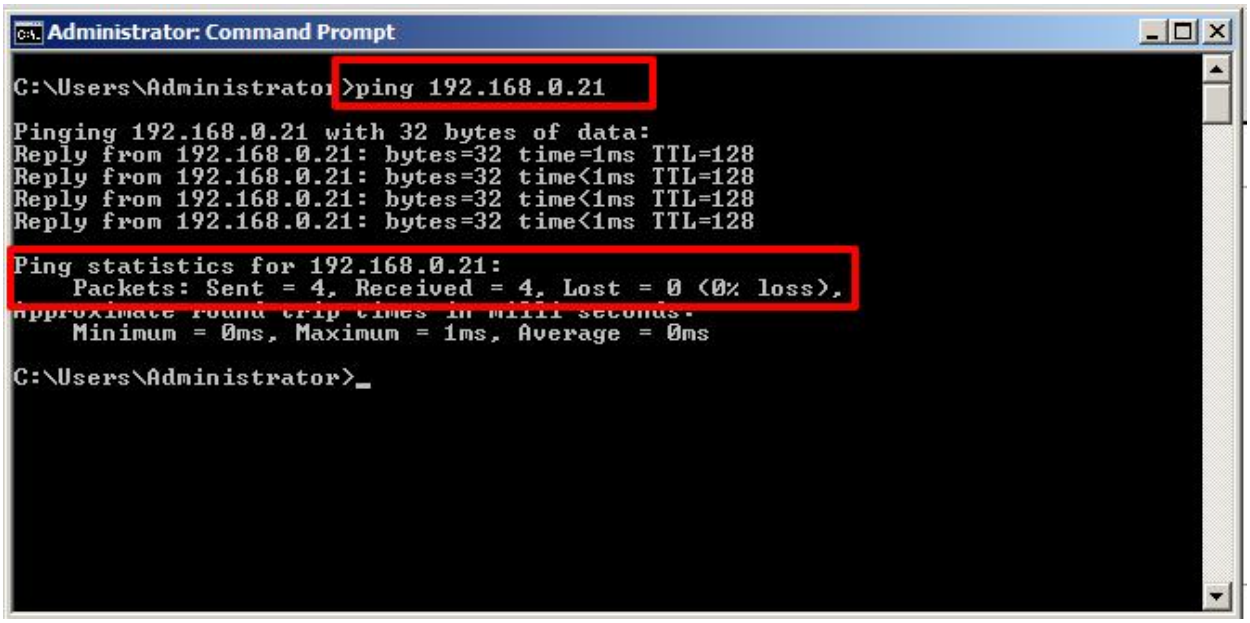

C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Windows 7 Pro>ipconfig
Windows IP Configuration
Ethernet adapter Bluetooth Network Connection:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
IPv4 Address. . . . . : 192.168.0.24
Subnet Mask . . . . . : 255.255.255.0
Tunnel adapter isatap.{616E406D-4176-4107-82AA-ACED741D1D19}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :


C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Windows 7 Pro>ipconfig
Windows IP Configuration
Ethernet adapter Bluetooth Network Connection:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
IPv4 Address. . . . . : 192.168.0.25
Subnet Mask . . . . . : 255.255.255.0
Tunnel adapter isatap.{616E406D-4176-4107-82AA-ACED741D1D19}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

4.3.4.4 Step 4 - Test Connectivity

We can test the connections between any of the nodes from the command line by typing 'ping <ip address of destination node>. We see below that there is a connection between the current node and the computer at 192.168.0.21 (Server1).

It is important to note that it may be necessary to disable the firewall from the machines we are wishing to communicate between.



5. Part B - Task B

- *Please configure the following Forest settings:*
- *Server1 is to be a Domain Controller of a tree called MSCCONV.IPA*
- *Client 1 is to be a workstation member of MSCCONV.IPA*
- *Server2 is to be setup as a second domain controller of MSCCONV.IPA*
- *MS-Core is to be a member server of MSCCONV.IPA*

5.1 Preamble

Servers within a domain are set up as either a member server or a domain controller (DC). A domain controller is a server on the domain network that controls host access to Windows domain resources. Domain controllers in a network are commonly described as "the centrepiece of the Active Directory Service"[10]. The domain controller stores user account information (global catalog), authenticates users and enforces security policy for a Windows domain .

Microsoft recommend the use of more than one domain controller in a domain, so that a domain can continue to function if a domain controller fails or must be disconnected [11]. A second domain controller can also be used as a means of balancing the workload of a network. We will be setting up Server2 as a second domain controller in our domain.

Another type of domain controller worth noting is a Read-Only Domain Controller (RODC). The RODC hosts read-only parts of the Active Directory database. A RODC can only receive replicated data from other domain controllers and cannot initiate any replication. RODC's are typically used in satellite locations of an organisation, where access to Active Directory is required but the security around the server is less secure.

Active Directory can be made up of multiple domains called trees. A tree is a collection of domains with a common namespace, such as guinness.diageo.local and baileys.diageo.local. The entire container within Active Directory is called a Forest, which is a group of one or more domains.

When setting up a domain controller, we must specify a Fully Qualified Domain Name (FQDN). If this is the very first domain in the forest it is referred to as the forest root domain. An FQDN has two elements, the first being the name of the network such as in our case MSCONV, and the second part is referred to as a top-level domain. Examples of top-level domains are .com .net etc. However, in Active Directory a valid top-level domain is not required. The most commonly used one is .local, however we will be using .IPA.

When the domain controllers have been setup, nodes can then be connected to the DC and become members of the domain. As members of the domain, they can be assigned privileges

[10] http://www.techopedia.com/definition/4193/domain-controller. Accessed July 18, 2014.
[11] http://technet.microsoft.com/en-us/library/cc738032(v=ws.10).aspx. Accessed July 18, 2014.

to access certain resources such as printers and files. Access to certain resources can also be restricted. The Client1, Client2 and MS-Core machines will be setup as members of our domain.

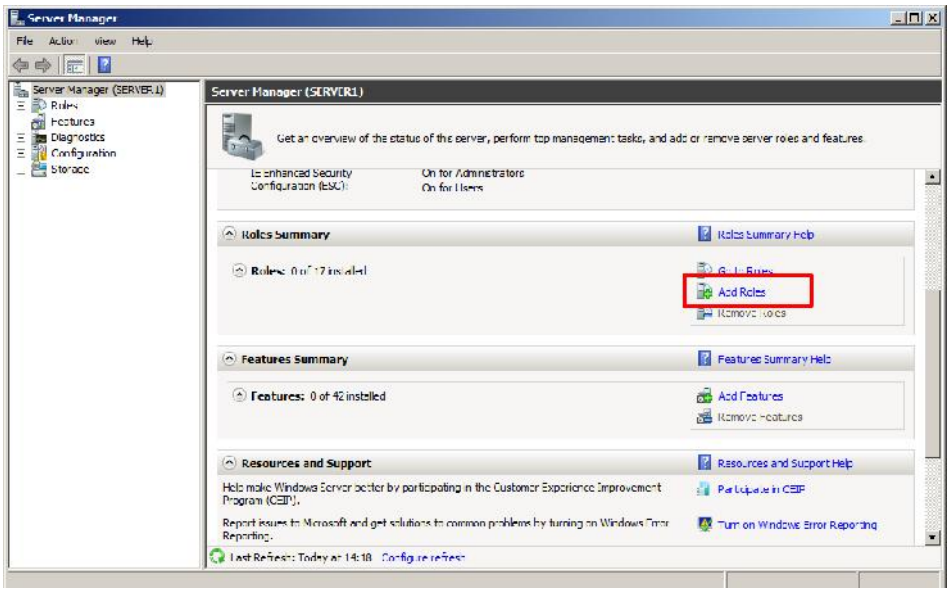
In order to setup a domain, Active Directory Domain Services must be installed as a role. Microsoft Active Directory Domain Services are the foundation for distributed networks built in Microsoft Windows Server 2008 operating systems that use Domain Controllers. Active Directory Domain Services "provide secure, structured, hierarchical data storage for objects in a network such as users, computers, printers, and services.[12]"

5.2 Procedure

5.2.1 Subtask 1 - Setup Server1 as a Domain Controller of the Tree

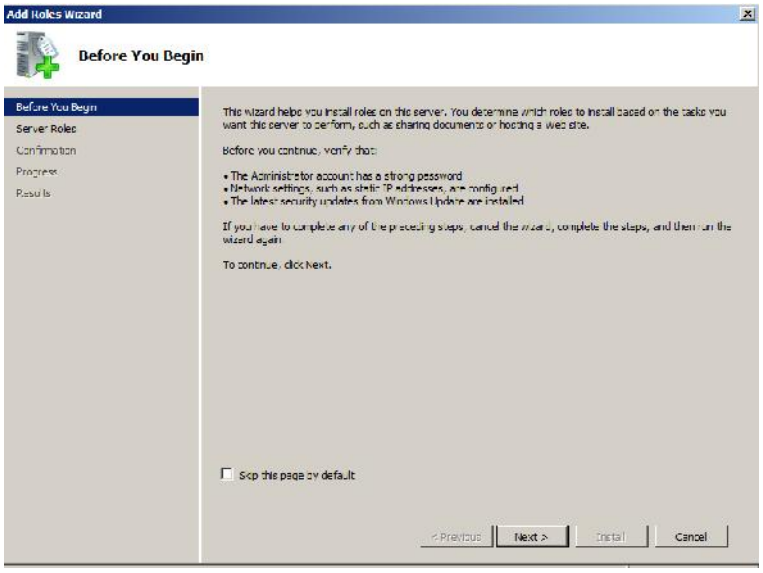
5.2.1.1 Step 1

Our first step will be to set up a domain, and in order to do this Active Directory Services must be installed as a role on our server. We open Server Manager and select Add Roles.

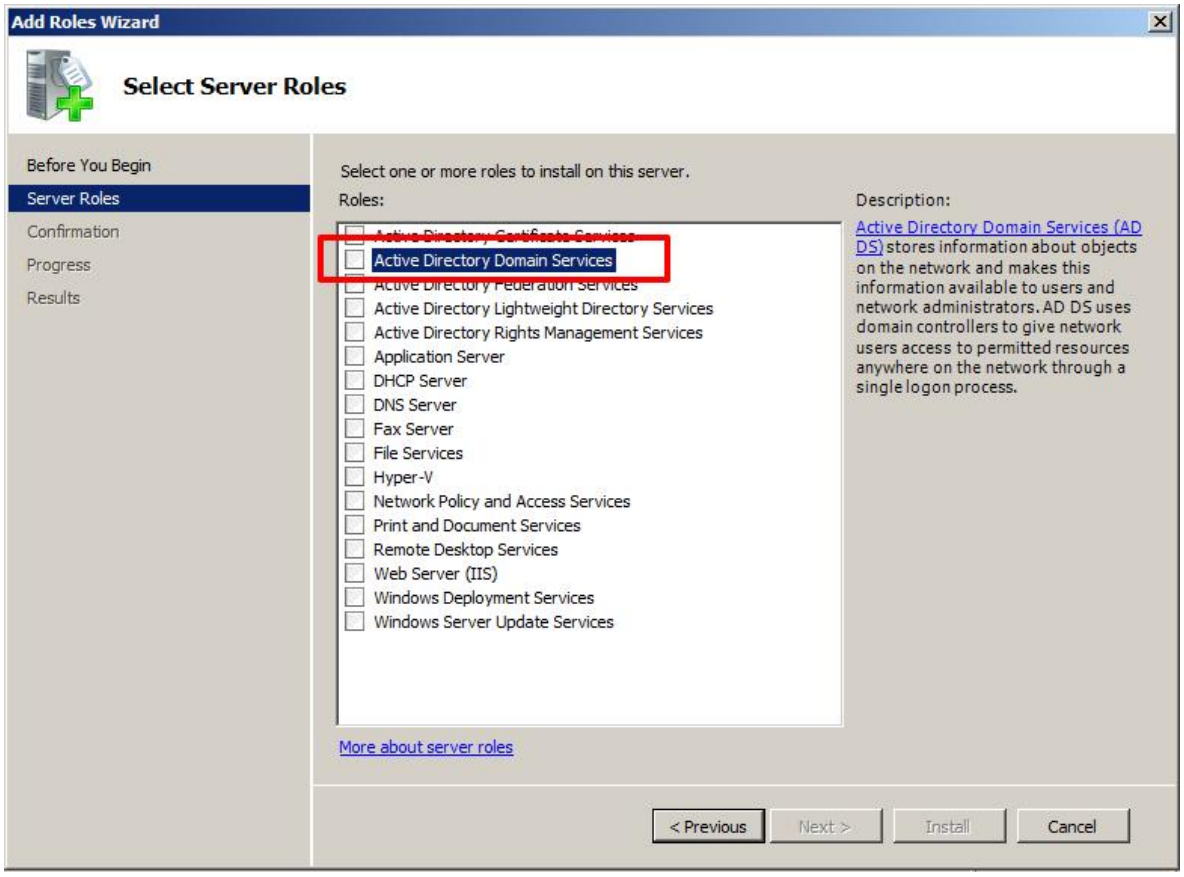


[12] http://msdn.microsoft.com/en-us/library/aa362244(v=vs.85).aspx. Accessed July 18, 2014.

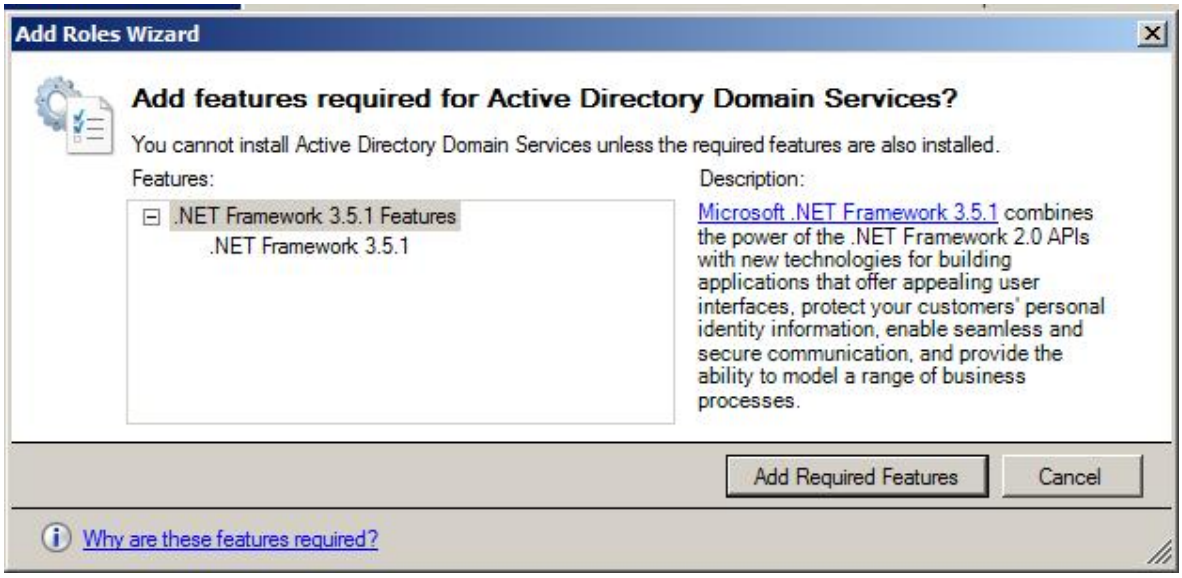
The first page of the Add Roles Wizard requires us to confirm that certain steps have been completed, such as the Administrator account having a strong password.


Add Roles Wizard
Before You Begin
Before You Begin
Server Roles
Confirmation
Progress
Results
This wizard helps you install roles on this server. You determine which roles to install based on the tasks you want this server to perform, such as sharing documents or hosting a Web site.
Before you continue, verify that:
• The Administrator account has a strong password
• Network settings, such as static IP addresses, are configured
• The latest security updates from Windows Update are installed
If you have to complete any of the preceding steps, cancel the wizard, complete the steps, and then run the wizard again.
To continue, click Next.
Skip this page by default
< Previous
Next >
Install
Cancel

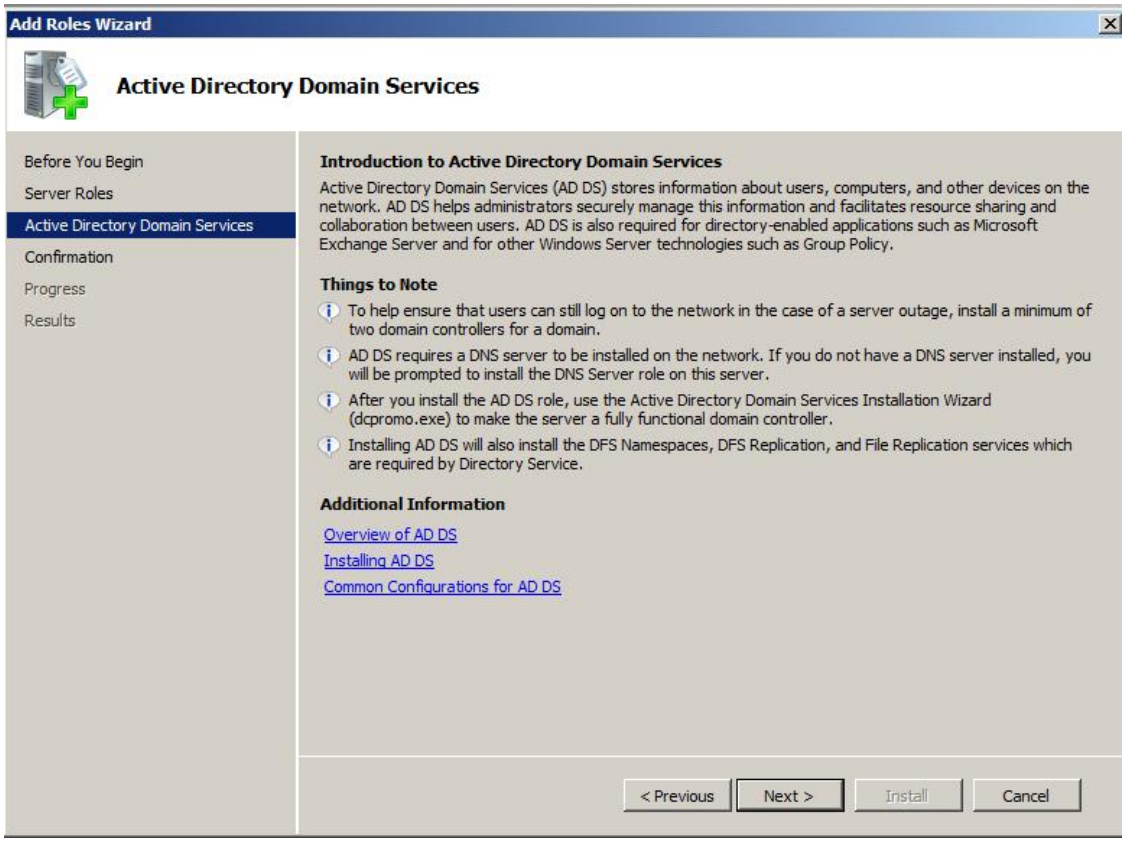
At the next window we select Active Directory Domain Services as the role we wish to install.


Add Roles Wizard
Select Server Roles
Before You Begin
Server Roles
Confirmation
Progress
Results
Select one or more roles to install on this server.
Roles:
Active Directory Domain Services
Active Directory Lightweight Directory Services
Active Directory Rights Management Services
Application Server
DHCP Server
DNS Server
Fax Server
File Services
Hyper-V
Network Policy and Access Services
Print and Document Services
Remote Desktop Services
Web Server (IIS)
Windows Deployment Services
Windows Server Update Services
Description:
Active Directory Domain Services (AD DS) stores information about objects on the network and makes this information available to users and network administrators. AD DS uses domain controllers to give network users access to permitted resources anywhere on the network through a single logon process.
More about server roles
< Previous
Next >
Install
Cancel

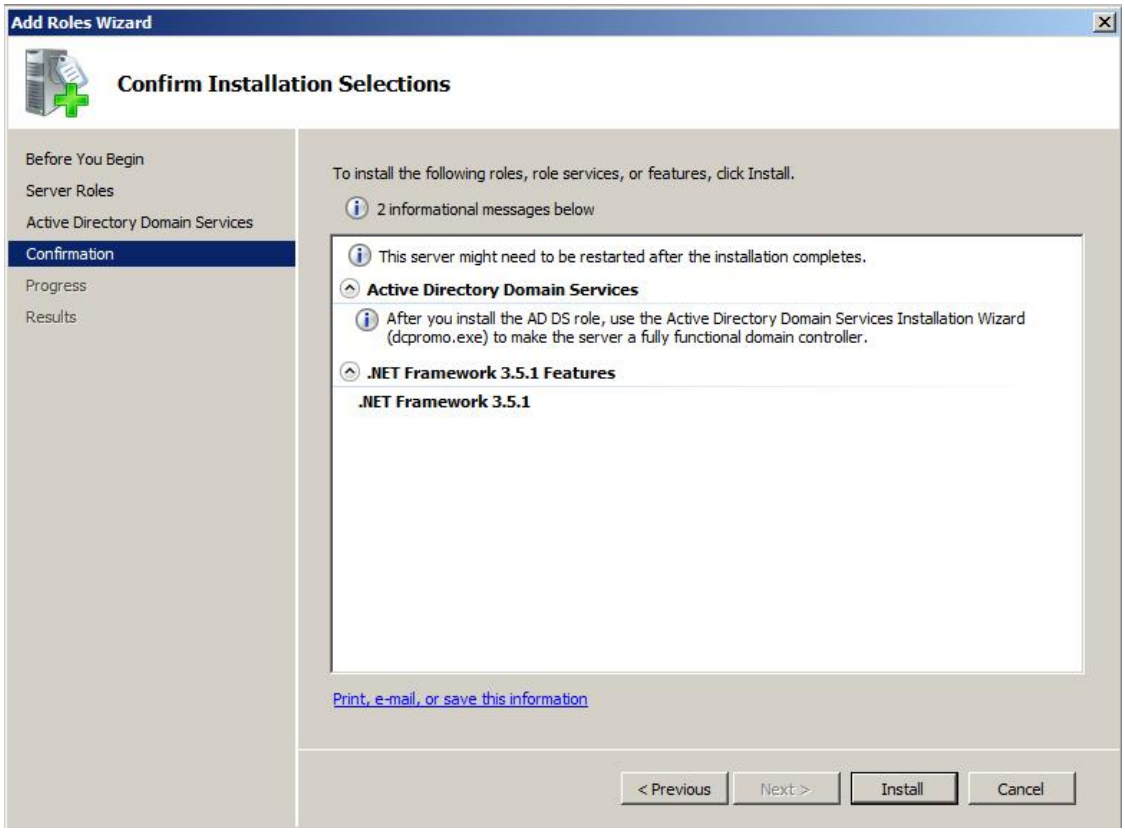
We then click to Add Required Features for the installation.


Add Roles Wizard
Add features required for Active Directory Domain Services?
You cannot install Active Directory Domain Services unless the required features are also installed.
Features:
.NET Framework 3.5.1 Features
.NET Framework 3.5.1
Description:
Microsoft .NET Framework 3.5.1 combines the power of the .NET Framework 2.0 APIs with new technologies for building applications that offer appealing user interfaces, protect your customers' personal identity information, enable seamless and secure communication, and provide the ability to model a range of business processes.
Add Required Features
Cancel
Why are these features required?

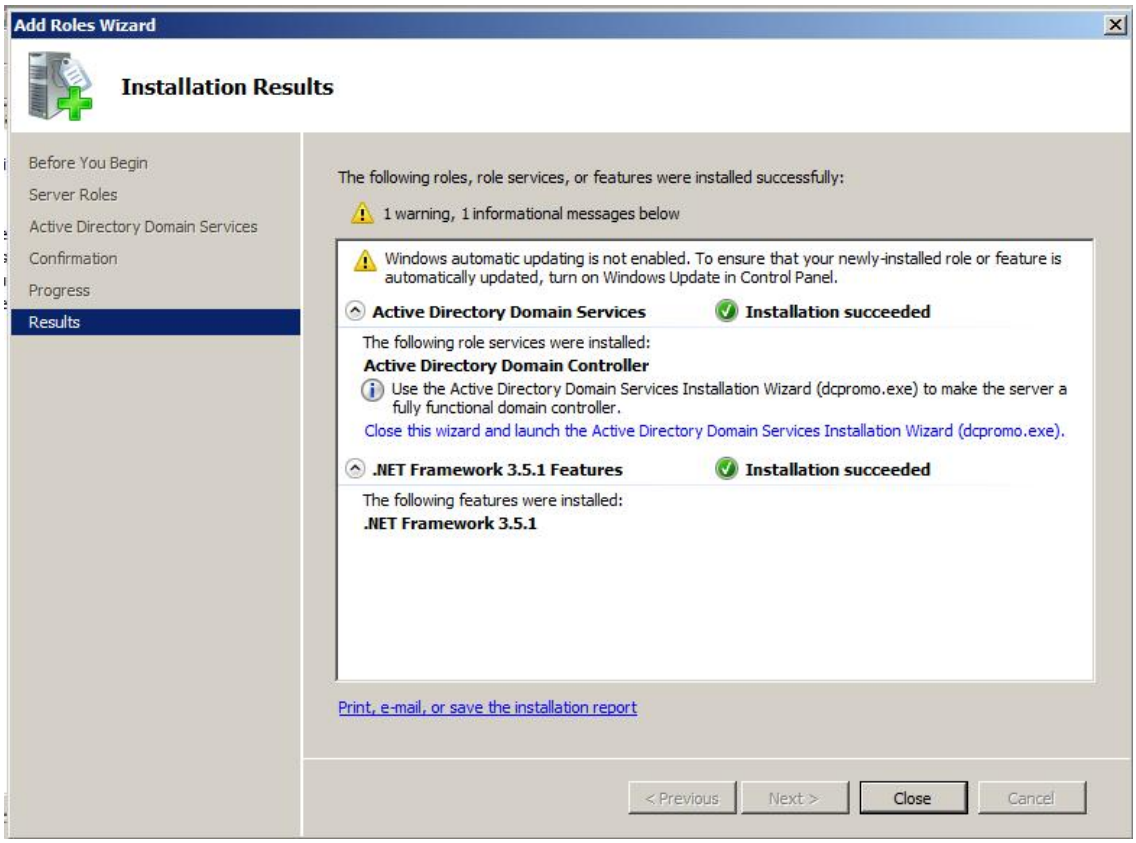
The next window gives further details concerning the server role.


Add Roles Wizard
Active Directory Domain Services
Before You Begin
Server Roles
Active Directory Domain Services
Confirmation
Progress
Results
Introduction to Active Directory Domain Services
Active Directory Domain Services (AD DS) stores information about users, computers, and other devices on the network. AD DS helps administrators securely manage this information and facilitates resource sharing and collaboration between users. AD DS is also required for directory-enabled applications such as Microsoft Exchange Server and for other Windows Server technologies such as Group Policy.
Things to Note
To help ensure that users can still log on to the network in the case of a server outage, install a minimum of two domain controllers for a domain.
AD DS requires a DNS server to be installed on the network. If you do not have a DNS server installed, you will be prompted to install the DNS Server role on this server.
After you install the AD DS role, use the Active Directory Domain Services Installation Wizard (dcpromo.exe) to make the server a fully functional domain controller.
Installing AD DS will also install the DFS Namespaces, DFS Replication, and File Replication services which are required by Directory Service.
Additional Information
Overview of AD DS
Installing AD DS
Common Configurations for AD DS
< Previous
Next >
Install
Cancel

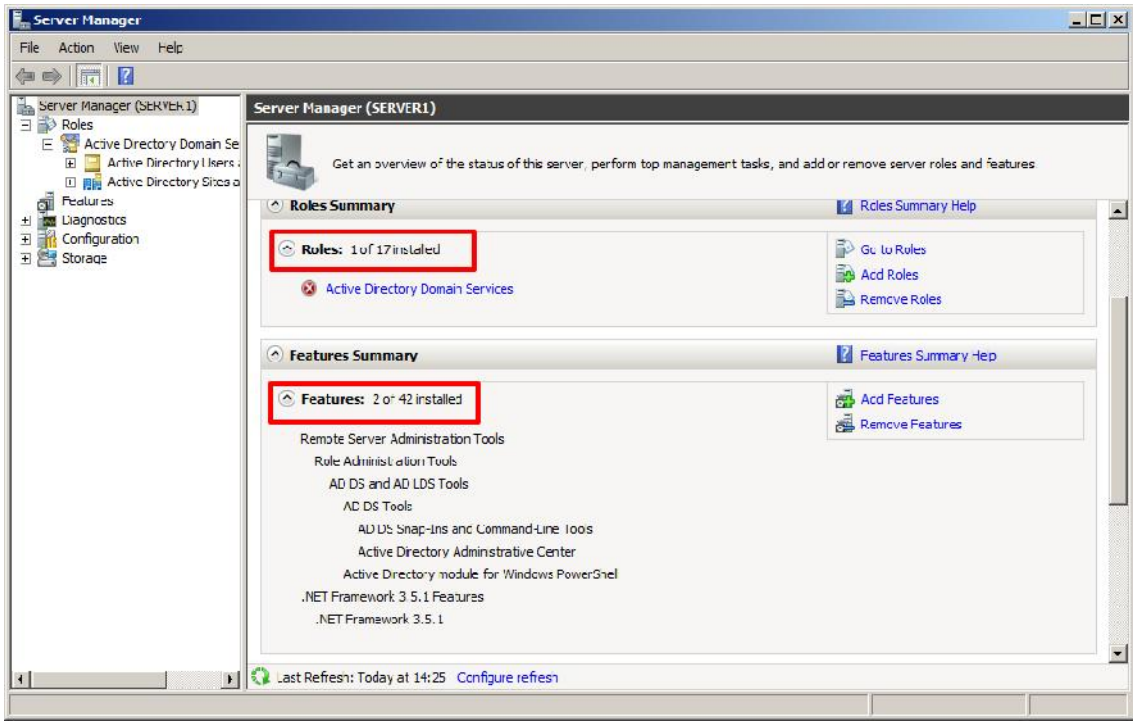
We then confirm the installation selections by clicking Install.


Add Roles Wizard
Confirm Installation Selections
Before You Begin
Server Roles
Active Directory Domain Services
Confirmation
Progress
Results
To install the following roles, role services, or features, click Install.
2 informational messages below
This server might need to be restarted after the installation completes.
Active Directory Domain Services
After you install the AD DS role, use the Active Directory Domain Services Installation Wizard (dcpromo.exe) to make the server a fully functional domain controller.
.NET Framework 3.5.1 Features
.NET Framework 3.5.1
Print, e-mail, or save this information
< Previous
Next >
Install
Cancel

The Installation Results window confirms the successful installation of our specific server roles and features.

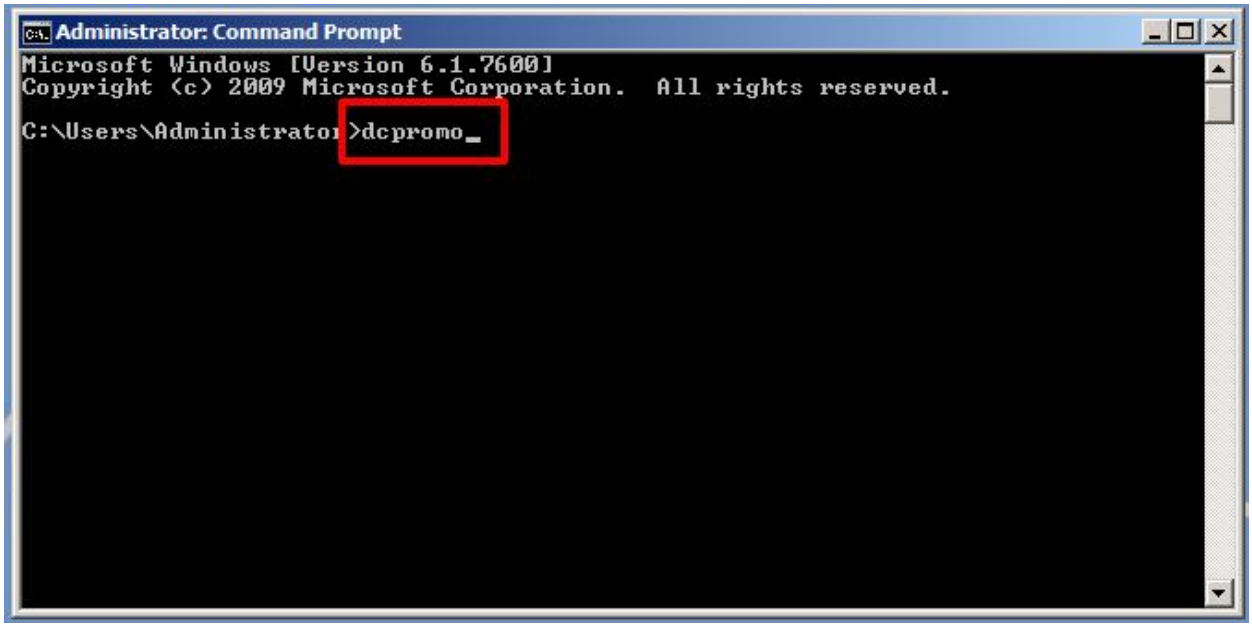

Add Roles Wizard
Installation Results
Before You Begin
Server Roles
Active Directory Domain Services
Confirmation
Progress
Results
The following roles, role services, or features were installed successfully:
1 warning, 1 informational messages below
Windows automatic updating is not enabled. To ensure that your newly-installed role or feature is automatically updated, turn on Windows Update in Control Panel.
Active Directory Domain Services
Installation succeeded
The following role services were installed:
Active Directory Domain Controller
Use the Active Directory Domain Services Installation Wizard (dcpromo.exe) to make the server a fully functional domain controller.
Close this wizard and launch the Active Directory Domain Services Installation Wizard (dcpromo.exe).
.NET Framework 3.5.1 Features
Installation succeeded
The following features were installed:
.NET Framework 3.5.1
Print, e-mail, or save the installation report
< Previous
Next >
Close
Cancel

Following this, from Server Manager we can see that the roles and features have been installed.

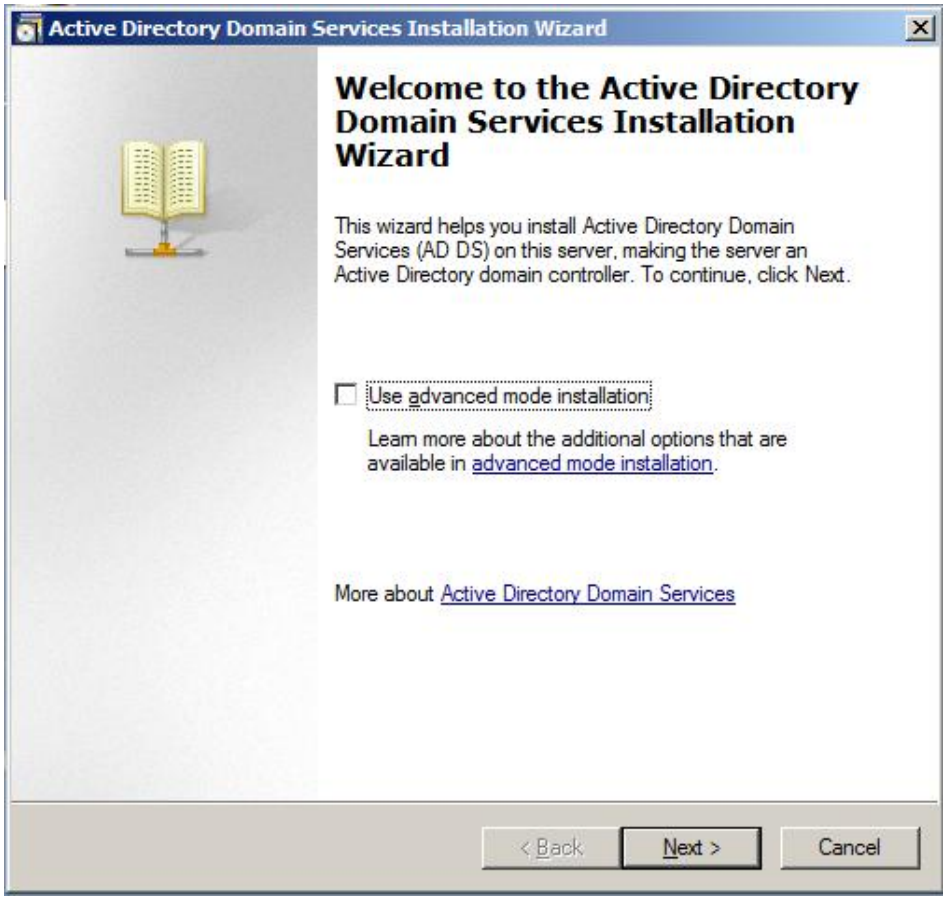


5.2.1.2 Step 2

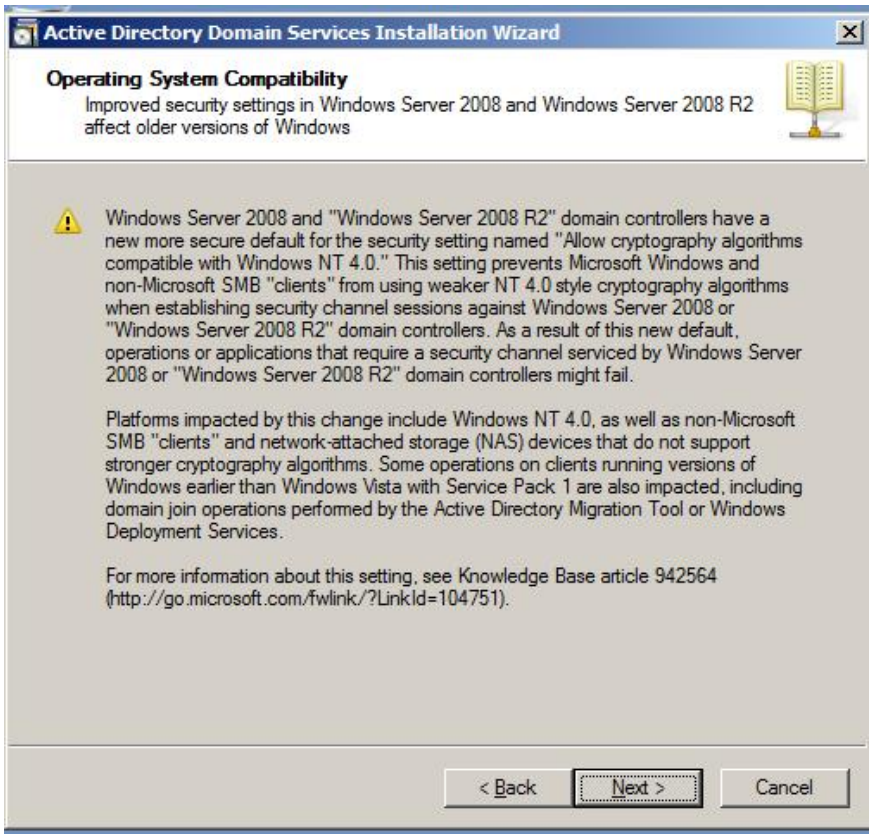
Once the server role has been installed we can then configure Server1 as a domain controller, and this is done by typing 'dcpromo' (Domain Controller Promoter) from the command line.


Administrator: Command Prompt
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Administrator>dcpromo_

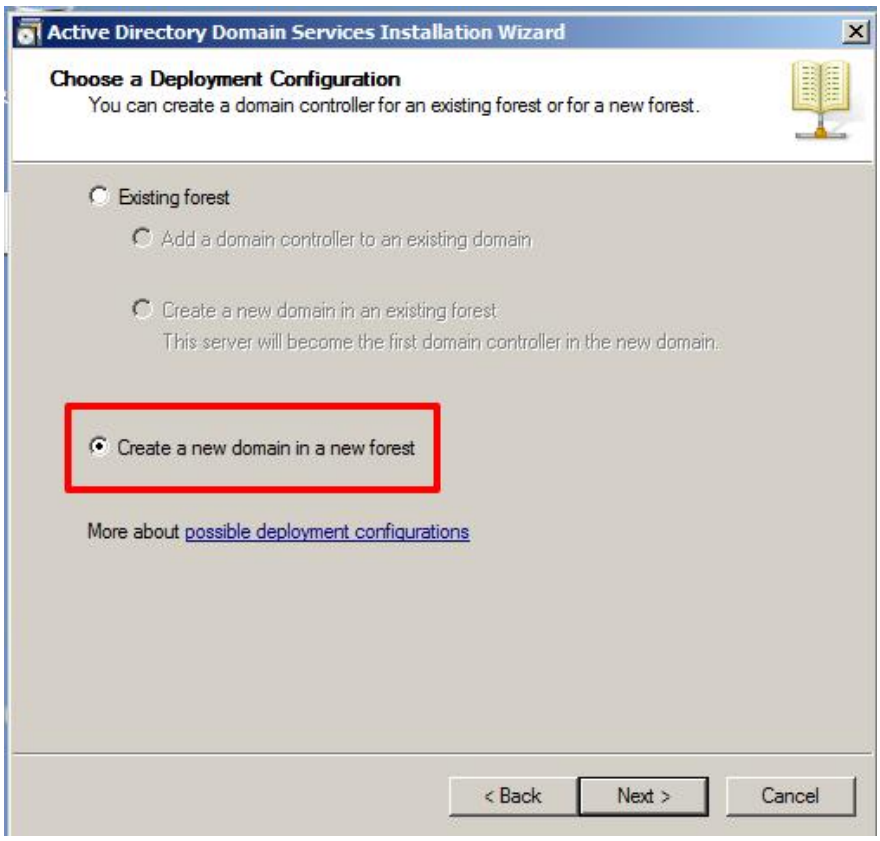
Having checked that the required roles and features are installed dcpromo then opens the Active Directory Domain Services Installation Wizard. We do not require the advanced mode installation and so we leave this unticked and click Next.


Active Directory Domain Services Installation Wizard
Welcome to the Active Directory Domain Services Installation Wizard
This wizard helps you install Active Directory Domain Services (AD DS) on this server, making the server an Active Directory domain controller. To continue, click Next.
Use advanced mode installation
Learn more about the additional options that are available in advanced mode installation.
More about Active Directory Domain Services
< Back
Next >
Cancel

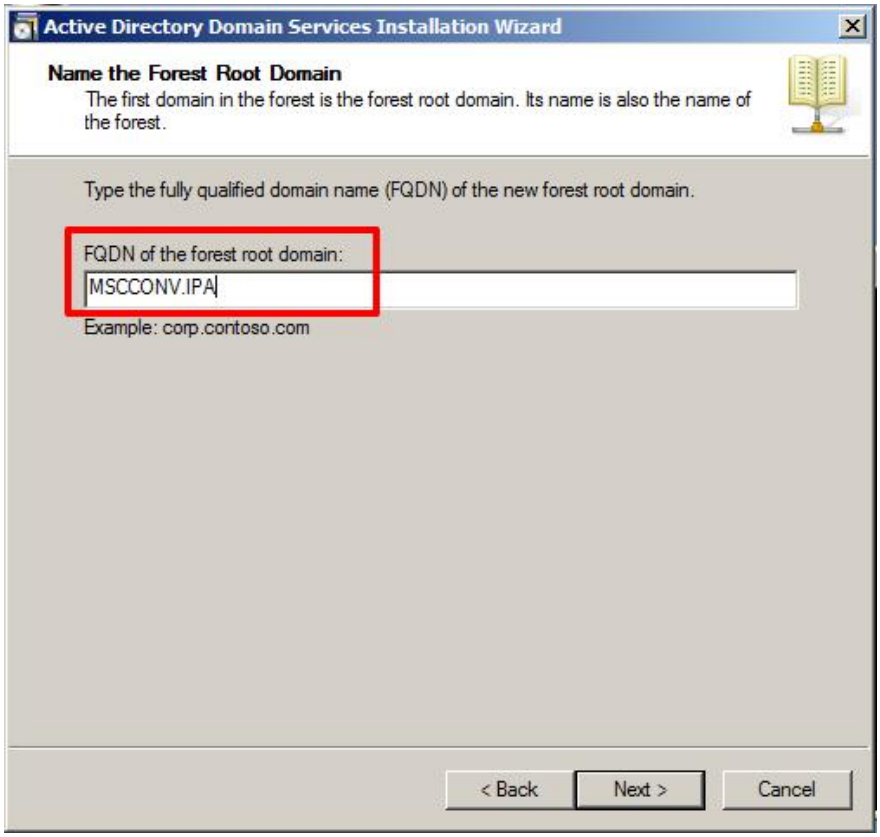
The next window describes some of the new features inherent in Windows Server 2008.


Active Directory Domain Services Installation Wizard
Operating System Compatibility
Improved security settings in Windows Server 2008 and Windows Server 2008 R2 affect older versions of Windows
Windows Server 2008 and "Windows Server 2008 R2" domain controllers have a new more secure default for the security setting named "Allow cryptography algorithms compatible with Windows NT 4.0." This setting prevents Microsoft Windows and non-Microsoft SMB "clients" from using weaker NT 4.0 style cryptography algorithms when establishing security channel sessions against Windows Server 2008 or "Windows Server 2008 R2" domain controllers. As a result of this new default, operations or applications that require a security channel serviced by Windows Server 2008 or "Windows Server 2008 R2" domain controllers might fail.
Platforms impacted by this change include Windows NT 4.0, as well as non-Microsoft SMB "clients" and network-attached storage (NAS) devices that do not support stronger cryptography algorithms. Some operations on clients running versions of Windows earlier than Windows Vista with Service Pack 1 are also impacted, including domain join operations performed by the Active Directory Migration Tool or Windows Deployment Services.
For more information about this setting, see Knowledge Base article 942564 (http://go.microsoft.com/fwlink/?LinkId=104751).
< Back
Next >
Cancel

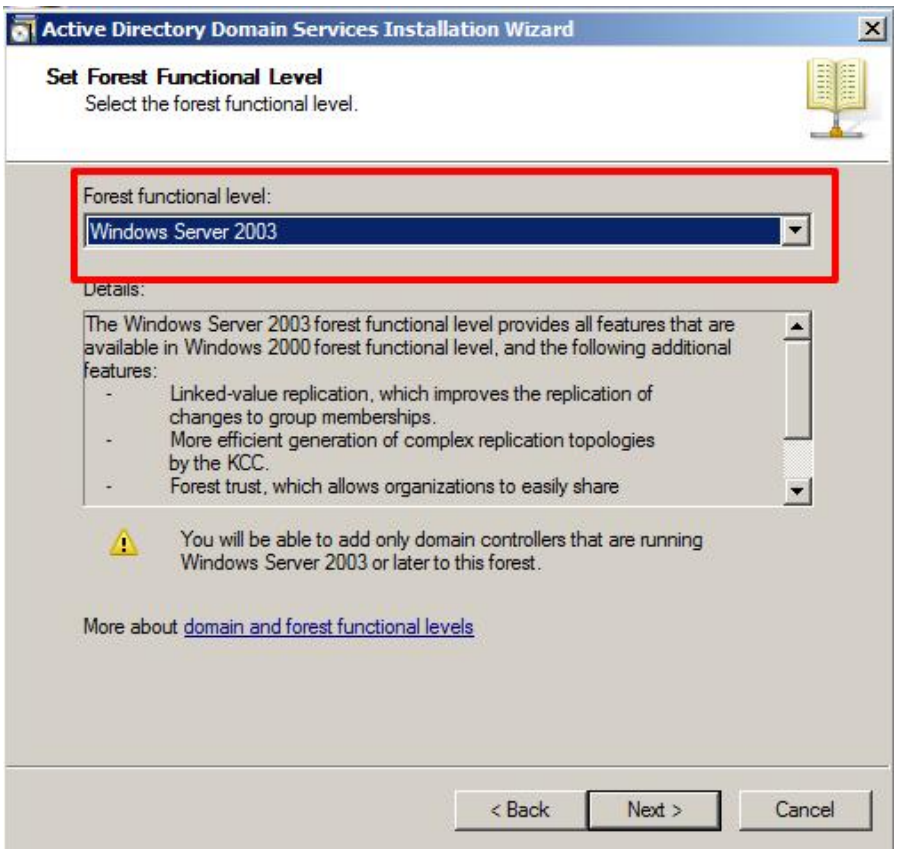
The next window offers the option to add a domain controller to an existing domain, create a new domain in an existing forest, or create a new domain in a new forest. We are creating a new domain in a new forest and so we click this radio button.

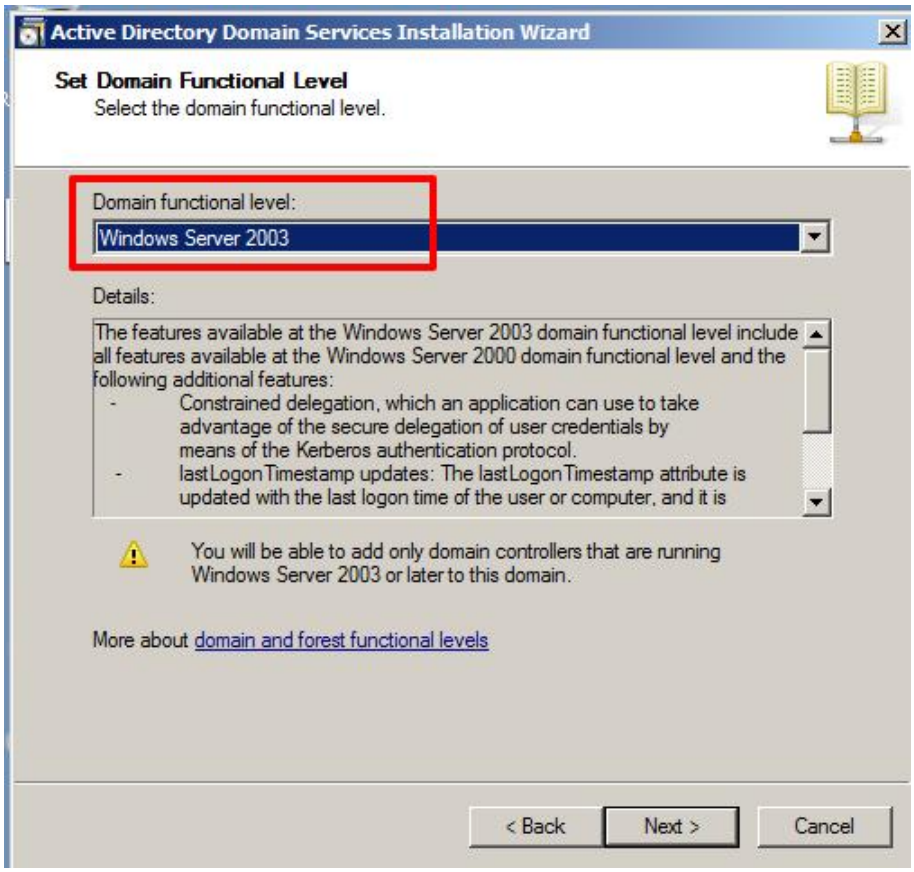

Active Directory Domain Services Installation Wizard
Choose a Deployment Configuration
You can create a domain controller for an existing forest or for a new forest.
Existing forest
Add a domain controller to an existing domain
Create a new domain in an existing forest
This server will become the first domain controller in the new domain.
Create a new domain in a new forest
More about possible deployment configurations
< Back
Next >
Cancel

At the next window we enter the assignment specified Fully Qualified Domain Name (FQDN)

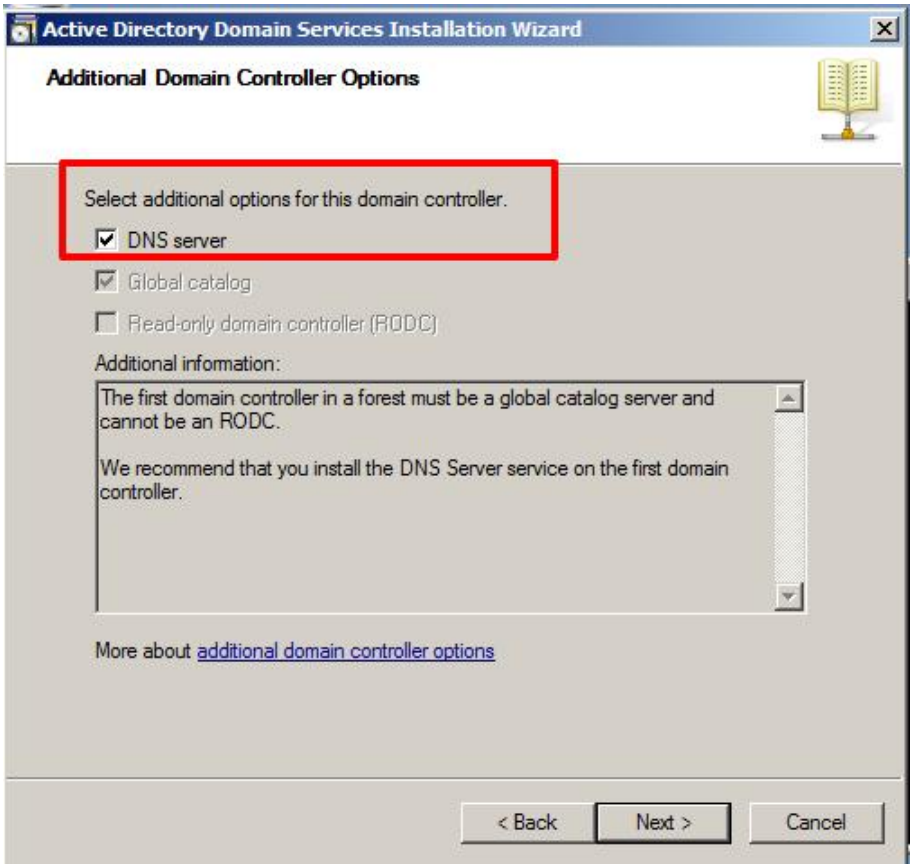

Active Directory Domain Services Installation Wizard
Name the Forest Root Domain
The first domain in the forest is the forest root domain. Its name is also the name of the forest.
Type the fully qualified domain name (FQDN) of the new forest root domain.
FQDN of the forest root domain:
MSCCONV.IPA
Example: corp.contoso.com
< Back
Next >
Cancel

The next two windows allow us to enable backward compatibility so that any Windows Server 2003 or Windows Server 2008 servers will be compatible with our new domain as regards Forest Functional Level and Domain Functional Level.


Active Directory Domain Services Installation Wizard
Set Forest Functional Level
Select the forest functional level.
Forest functional level:
Windows Server 2003
Details:
The Windows Server 2003 forest functional level provides all features that are available in Windows 2000 forest functional level, and the following additional features:
- Linked-value replication, which improves the replication of changes to group memberships.
- More efficient generation of complex replication topologies by the KCC.
- Forest trust, which allows organizations to easily share
You will be able to add only domain controllers that are running Windows Server 2003 or later to this forest.
More about domain and forest functional levels
< Back
Next >
Cancel


Active Directory Domain Services Installation Wizard
Set Domain Functional Level
Select the domain functional level.
Domain functional level:
Windows Server 2003
Details:
The features available at the Windows Server 2003 domain functional level include all features available at the Windows Server 2000 domain functional level and the following additional features:
- Constrained delegation, which an application can use to take advantage of the secure delegation of user credentials by means of the Kerberos authentication protocol.
- lastLogonTimestamp updates: The lastLogonTimestamp attribute is updated with the last logon time of the user or computer, and it is
You will be able to add only domain controllers that are running Windows Server 2003 or later to this domain.
More about domain and forest functional levels
< Back
Next >
Cancel

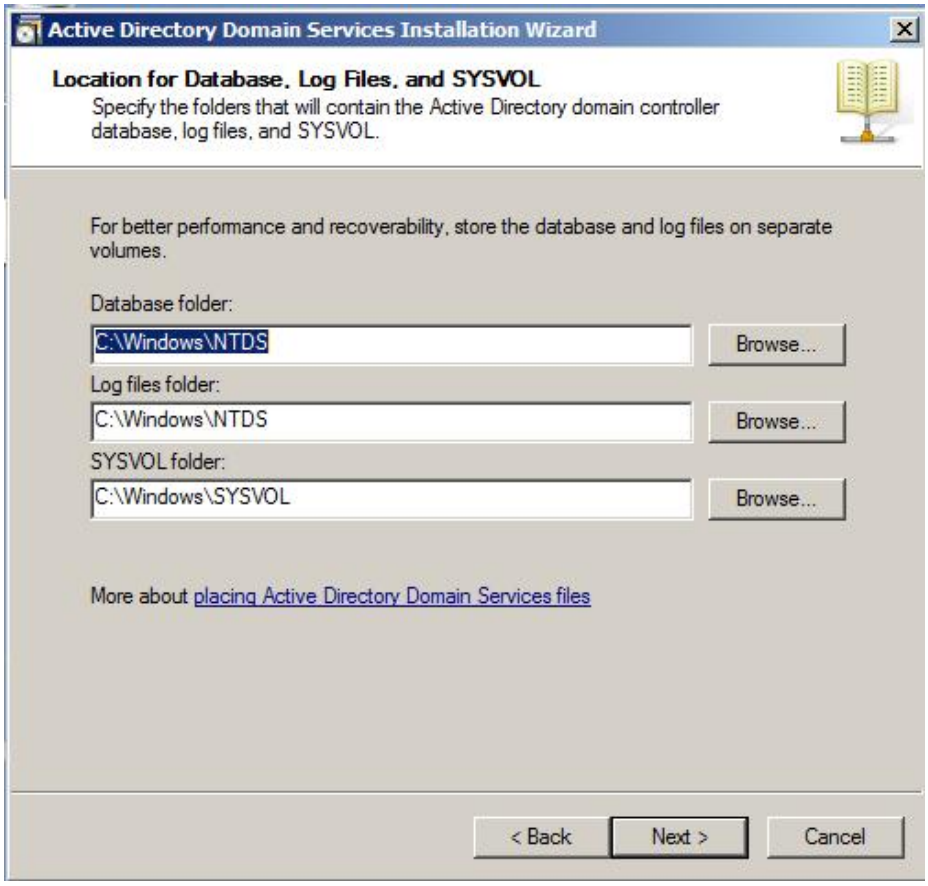
As we are currently installing our first domain controller, the only additional option available is DNS Server, which we select.


Active Directory Domain Services Installation Wizard
Additional Domain Controller Options
Select additional options for this domain controller.
DNS server
Global catalog
Read-only domain controller (RODC)
Additional information:
The first domain controller in a forest must be a global catalog server and cannot be an RODC.
We recommend that you install the DNS Server service on the first domain controller.
More about additional domain controller options
< Back
Next >
Cancel

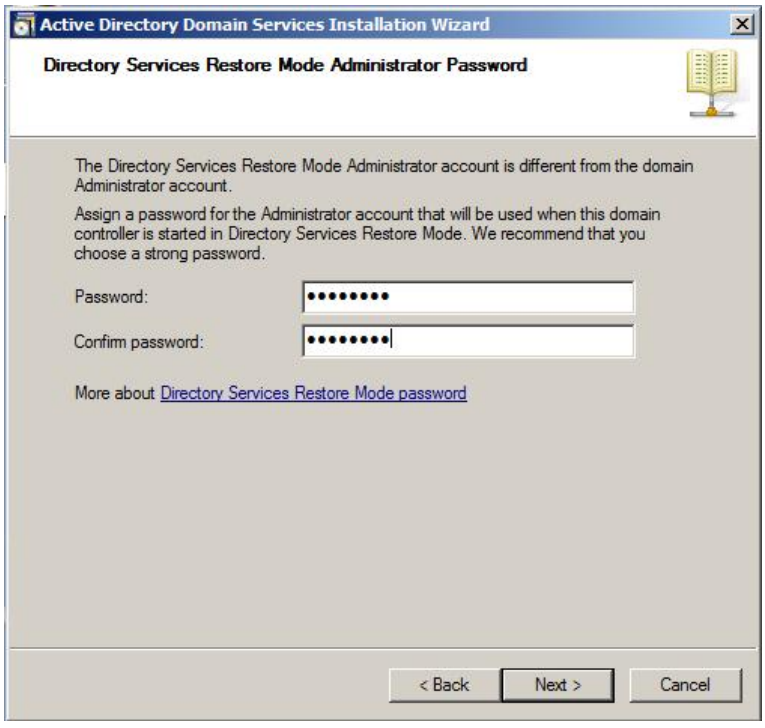
A warning message is then displayed which we can ignore as the server will be configured later.

Active Directory Domain Services Installation Wizard
A delegation for this DNS server cannot be created because the authoritative parent zone cannot be found or it does not run Windows DNS server. If you are integrating with an existing DNS infrastructure, you should manually create a delegation to this DNS server in the parent zone to ensure reliable name resolution from outside the domain "MSCCONV.IPA". Otherwise, no action is required.
Do you want to continue?
Yes
No

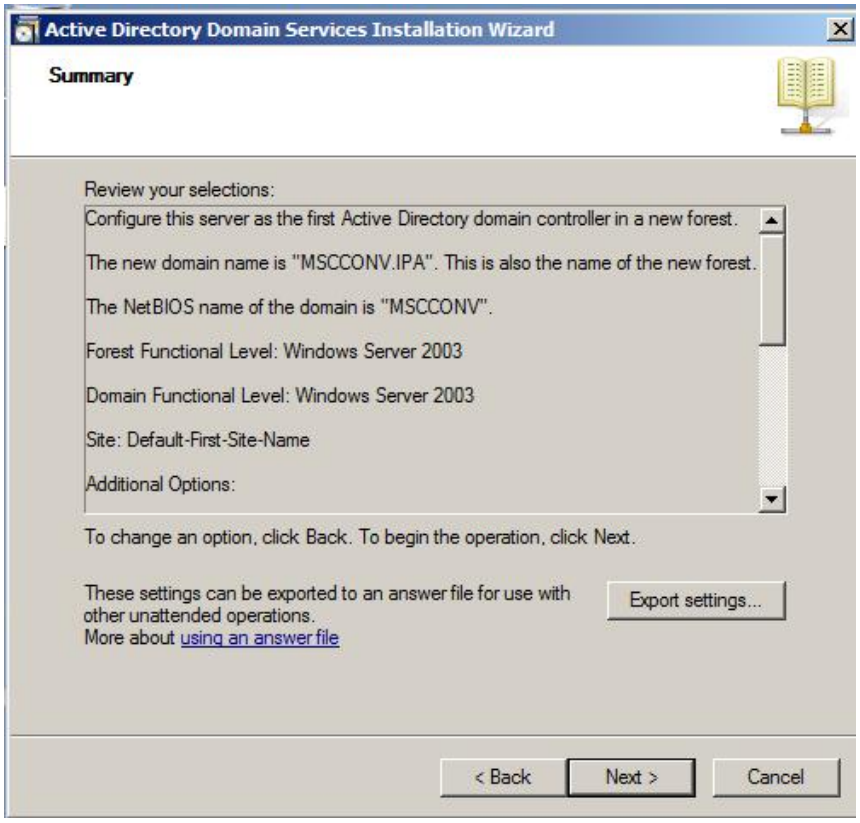
We can then specify locations for database, log files and SYVOL to be stored, which we leave as default.


Active Directory Domain Services Installation Wizard
Location for Database, Log Files, and SYSVOL
Specify the folders that will contain the Active Directory domain controller database, log files, and SYSVOL.
For better performance and recoverability, store the database and log files on separate volumes.
Database folder:
C:\Windows\NTDS
Browse...
Log files folder:
C:\Windows\NTDS
Browse...
SYSVOL folder:
C:\Windows\SYSVOL
Browse...
More about placing Active Directory Domain Services files
< Back
Next >
Cancel

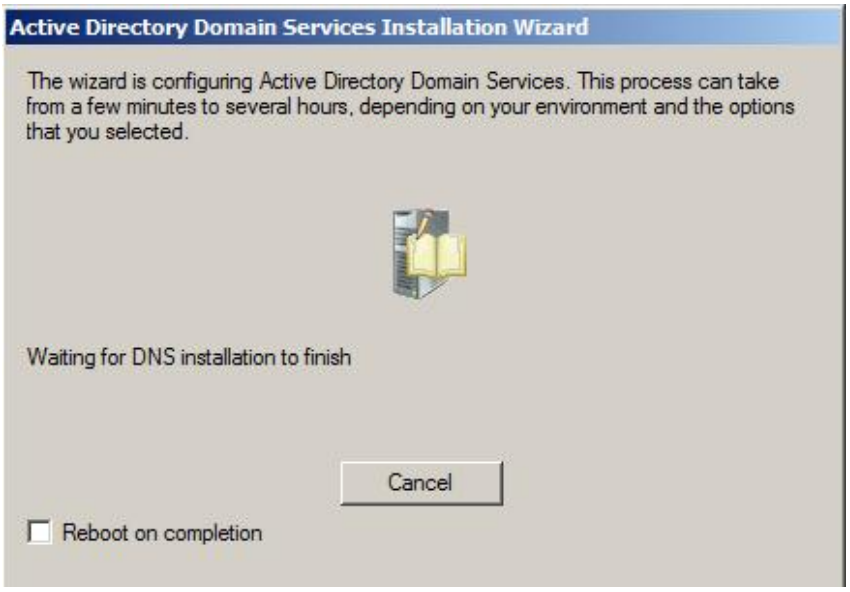
The next step is to create the Directory Services Restore Mode (DSRM) password, which is used in the event of the Active Directory requiring to be restored or maintained, and as such this password should be recorded and stored in a safe place such as a fire-proof safe.


Active Directory Domain Services Installation Wizard
Directory Services Restore Mode Administrator Password
The Directory Services Restore Mode Administrator account is different from the domain Administrator account.
Assign a password for the Administrator account that will be used when this domain controller is started in Directory Services Restore Mode. We recommend that you choose a strong password.
Password:
Confirm password:
More about Directory Services Restore Mode password
< Back
Next >
Cancel

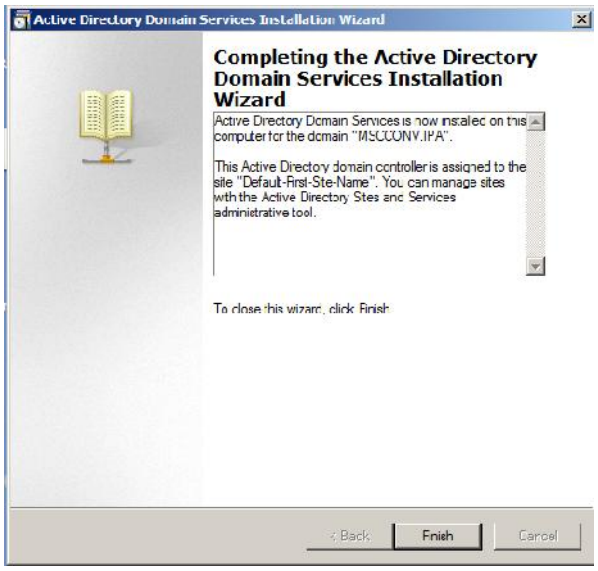
The next window gives a summary of selected settings which can be exported to allow the same installation to be rolled out on several computers.

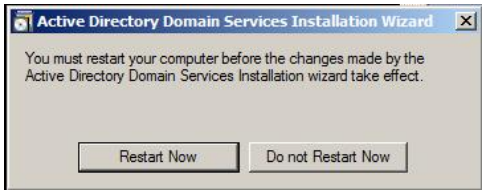

Active Directory Domain Services Installation Wizard
Summary
Review your selections:
Configure this server as the first Active Directory domain controller in a new forest.
The new domain name is "MSCCONV.IPA". This is also the name of the new forest.
The NetBIOS name of the domain is "MSCCONV".
Forest Functional Level: Windows Server 2003
Domain Functional Level: Windows Server 2003
Site: Default-First-Site-Name
Additional Options:
To change an option, click Back. To begin the operation, click Next.
These settings can be exported to an answer file for use with other unattended operations.
More about using an answer file
Export settings...
< Back
Next >
Cancel

The wizard then configures Active Directory Domain Services as we have directed.


Active Directory Domain Services Installation Wizard
The wizard is configuring Active Directory Domain Services. This process can take from a few minutes to several hours, depending on your environment and the options that you selected.
Waiting for DNS installation to finish
Cancel
Reboot on completion

Finally we click Finish to complete the installation and are then prompted to restart the computer to initialise the settings.

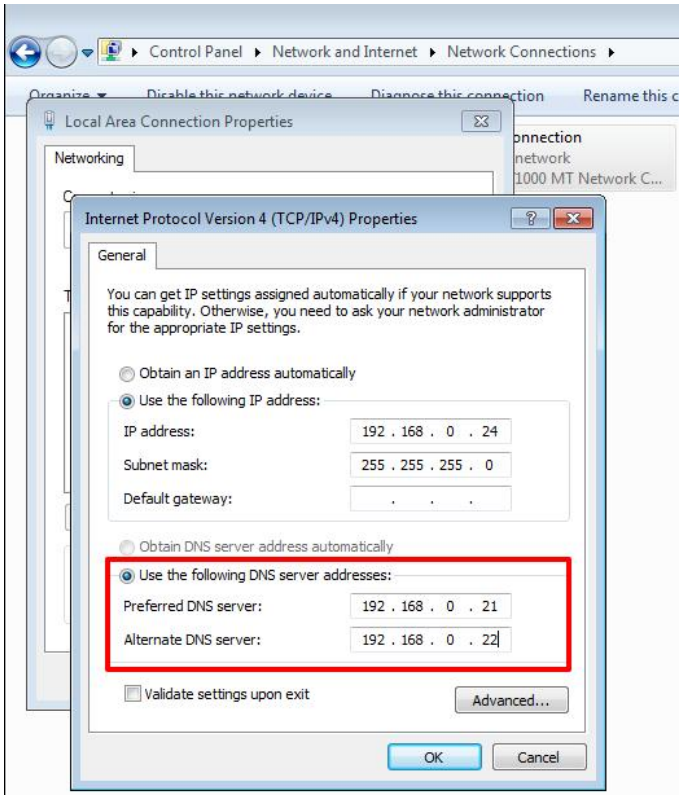

Active Directory Domain Services Installation Wizard
Completing the Active Directory Domain Services Installation Wizard
Active Directory Domain Services is now installed on this computer for the domain "MSCCONV.IPA".
This Active Directory domain controller is assigned to the site "Default-First-Ste-Name". You can manage sites with the Active Directory Sites and Services administrative tool.
To close this wizard, click Finish.
< Back
Finish
Cancel


Active Directory Domain Services Installation Wizard
You must restart your computer before the changes made by the Active Directory Domain Services Installation wizard take effect.
Restart Now
Do not Restart Now

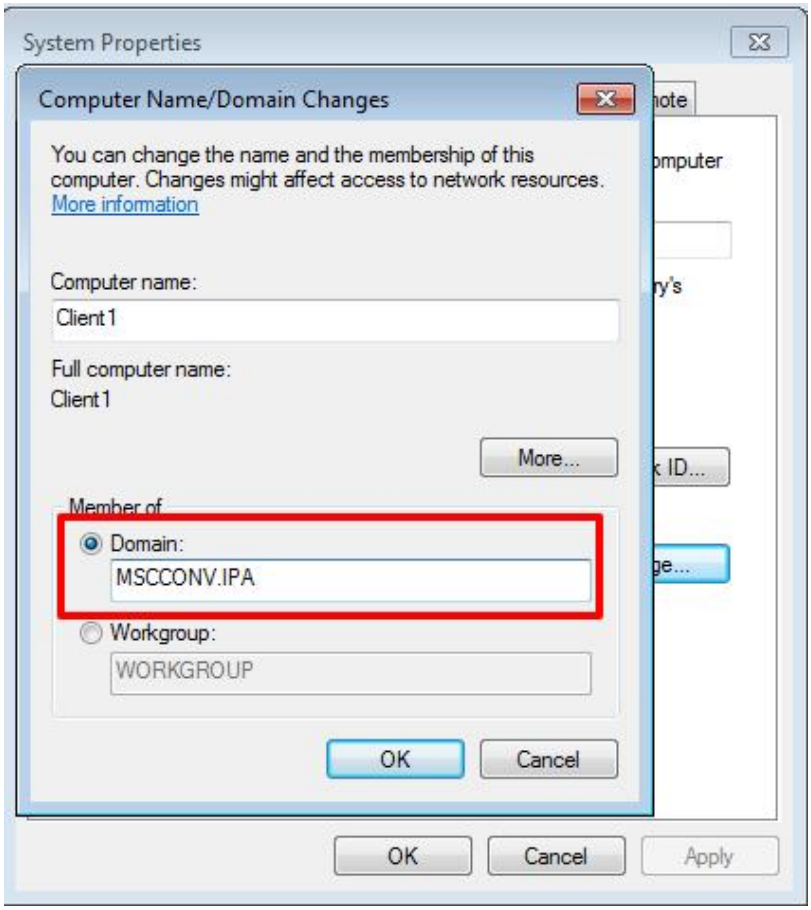
5.2.2 Subtask 2 - Setup Client1 as a Workstation Member of the Tree

5.2.2.1 Step 1

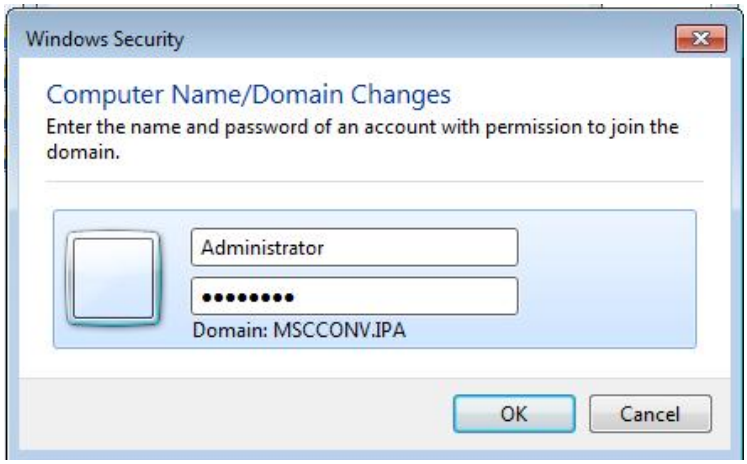
To setup client1 as a workstation member of the domain server, we firstly setup the member on the same network as the domain server. We previously assigned a static IP address to client1 within the same range as Server1, and we now set the IP address of Server1 as the preferred DNS of client1, setting the IP address of Server2 as the alternate DNS address (Server2 will be set up as a second domain controller later)


Control Panel ▸ Network and Internet ▸ Network Connections ▸
Local Area Connection Properties
Networking
Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 0 . 24
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 192 . 168 . 0 . 21
Alternate DNS server: 192 . 168 . 0 . 22
Validate settings upon exit
Advanced...
OK
Cancel

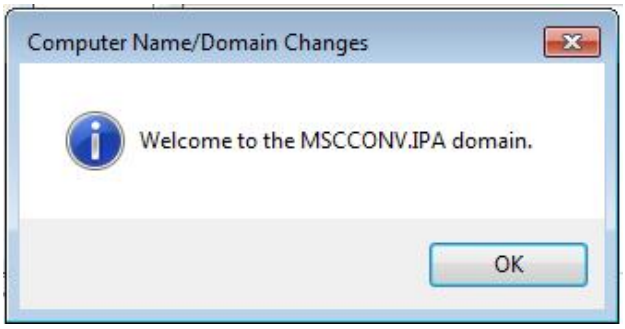
The next step is to add Client1 as a member of our domain which we effect by opening System Properties and clicking Change. We then select the Member of Domain radio button and enter the FQDN for our domain as previously specified.



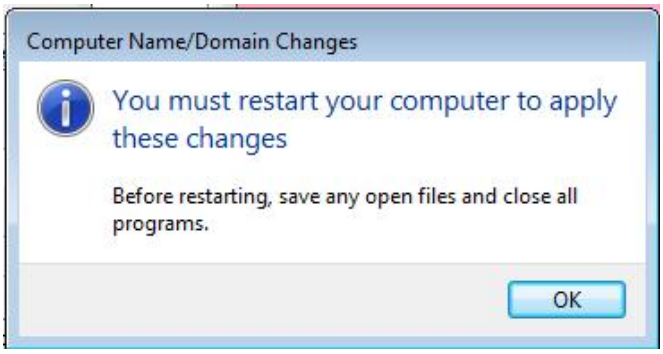
We then enter the Administrator password in order to get permission to join the domain.



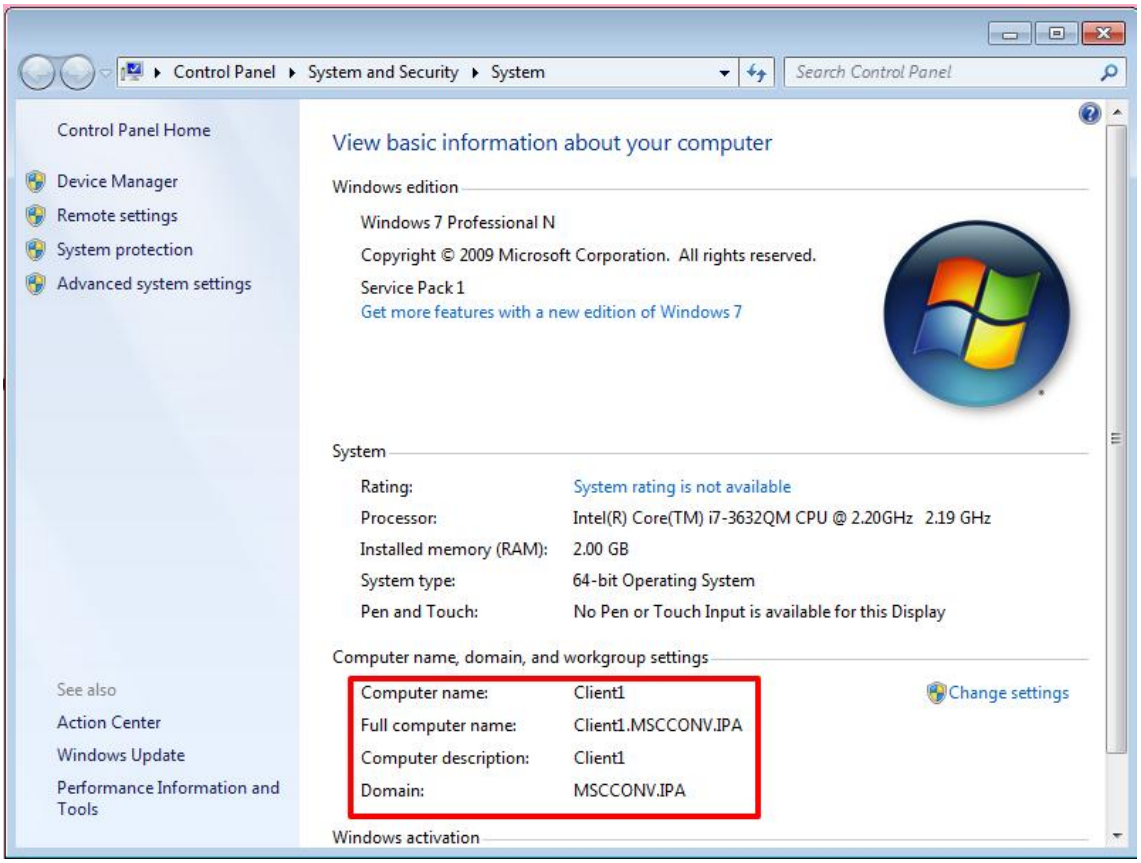
A message advises us that the computer is now a member of the domain.



In order to effect the changes it is necessary to restart the computer.


Computer Name/Domain Changes
You must restart your computer to apply these changes
Before restarting, save any open files and close all programs.
OK

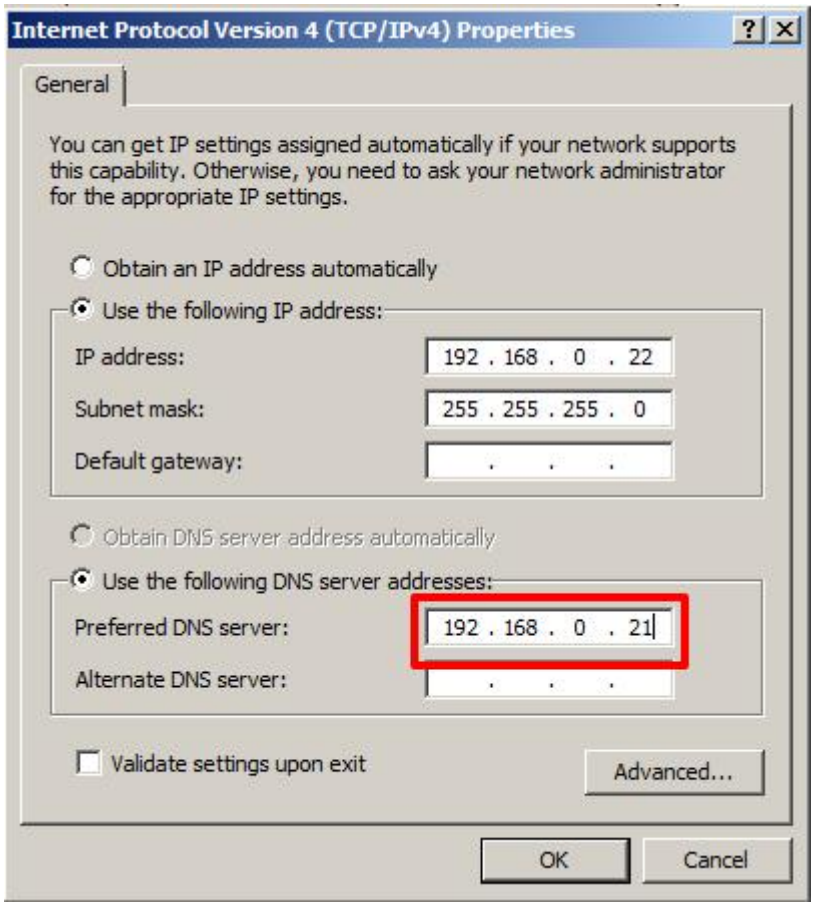
Once the computer has restarted, by right clicking on computer from the start menu and selecting properties, we can see that the computer is now a member of the domain.


Control Panel ▸ System and Security ▸ System
Search Control Panel
Control Panel Home
Device Manager
Remote settings
System protection
Advanced system settings
View basic information about your computer
Windows edition
Windows 7 Professional N
Copyright © 2009 Microsoft Corporation. All rights reserved.
Service Pack 1
Get more features with a new edition of Windows 7
System
Rating: System rating is not available
Processor: Intel(R) Core(TM) i7-3632QM CPU @ 2.20GHz 2.19 GHz
Installed memory (RAM): 2.00 GB
System type: 64-bit Operating System
Pen and Touch: No Pen or Touch Input is available for this Display
Computer name, domain, and workgroup settings
Computer name: Client1
Full computer name: Client1.MSCCONV.IPA
Computer description: Client1
Domain: MSCCONV.IPA
Change settings
Windows activation
See also
Action Center
Windows Update
Performance Information and Tools

5.2.3 Subtask 3 - Setup Server2 as a Second Domain Controller of the Tree

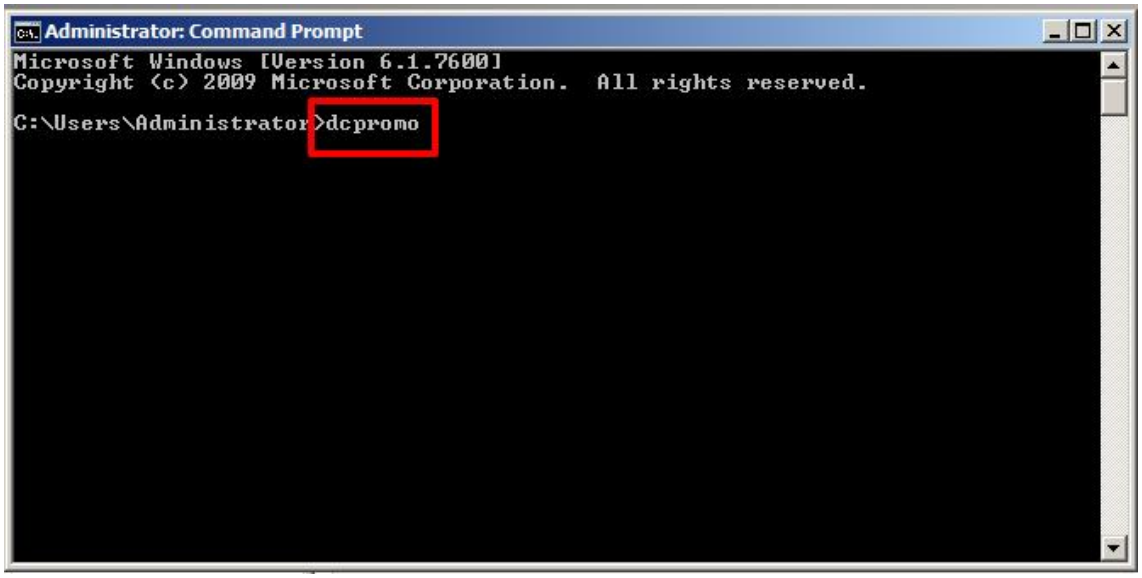
5.2.3.1 Step 1

Similarly to the steps above, the first step in adding Server2 as a second domain controller to our domain is, given that Server2 has already been assigned a static IP address within the same range as Server1, to add the IP address of Server1 as the preferred DNS of Server2.

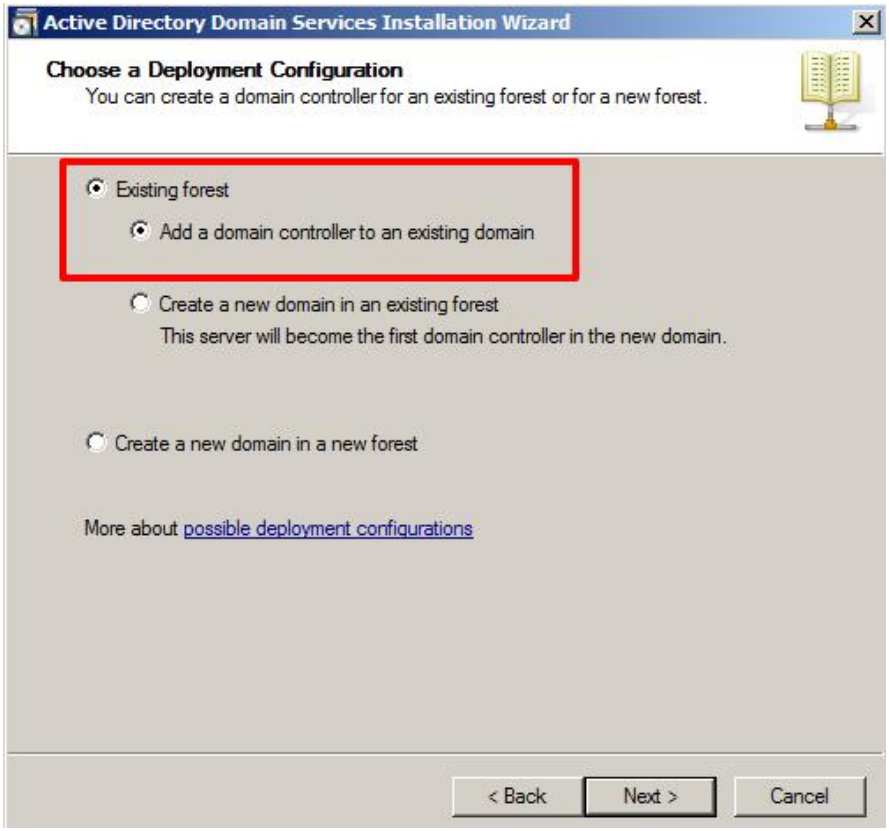

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 0 . 22
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 192 . 168 . 0 . 21
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

5.2.3.2 Step 2

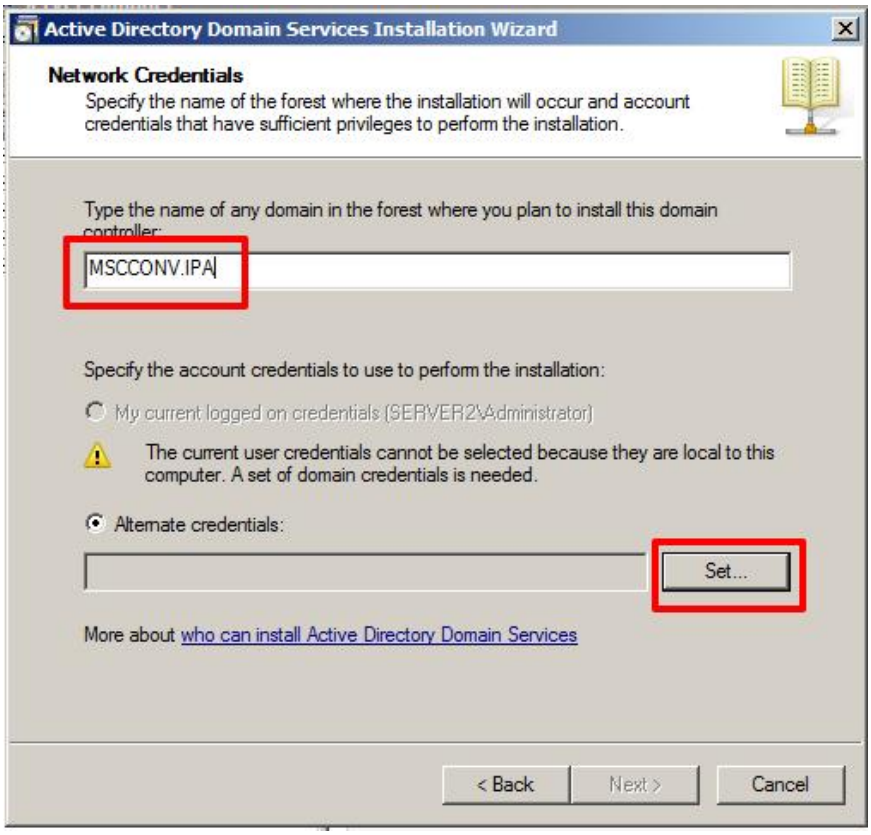
As with Server1 we enter 'dcpromo' from the command line.


Administrator: Command Prompt
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Administrator>dcpromo

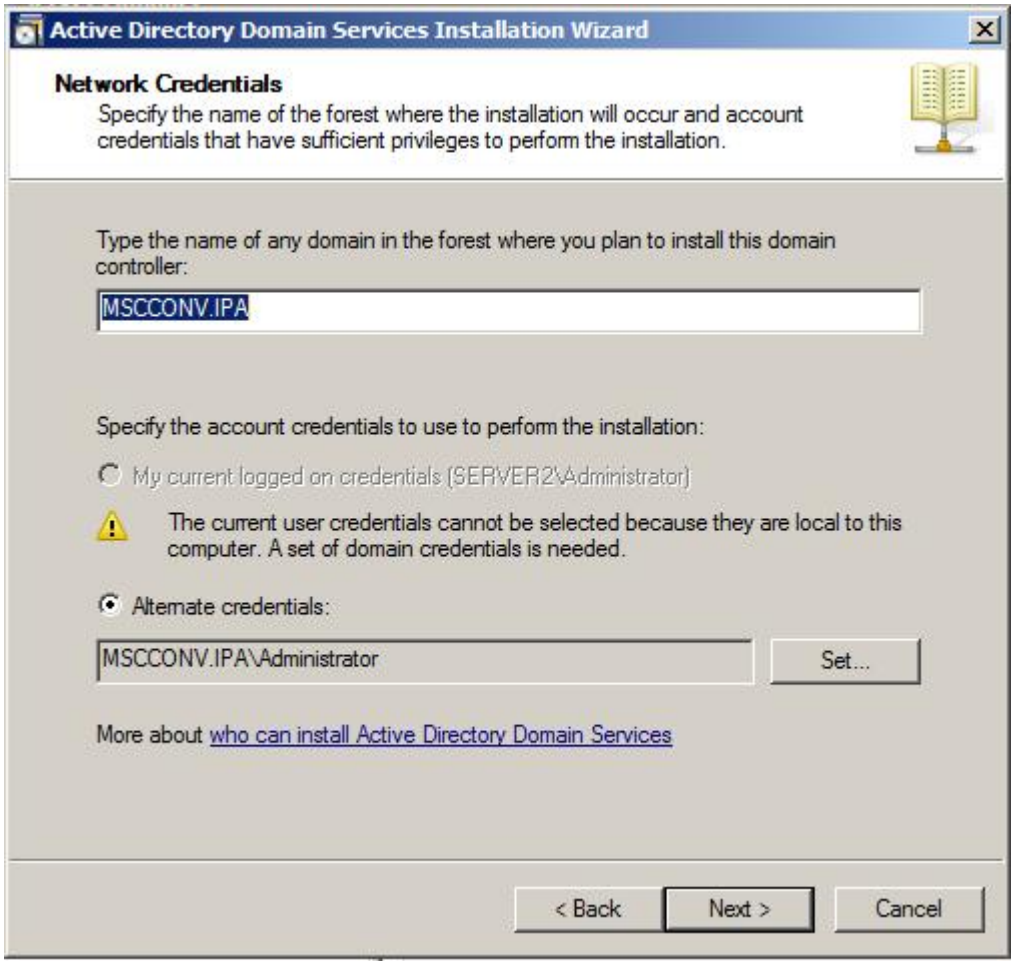
We follow the steps as with Server1, however for Server2 we select the Add a domain controller to an existing domain radio button.


Active Directory Domain Services Installation Wizard
Choose a Deployment Configuration
You can create a domain controller for an existing forest or for a new forest.
Existing forest
Add a domain controller to an existing domain
Create a new domain in an existing forest
This server will become the first domain controller in the new domain.
Create a new domain in a new forest
More about possible deployment configurations
< Back
Next >
Cancel

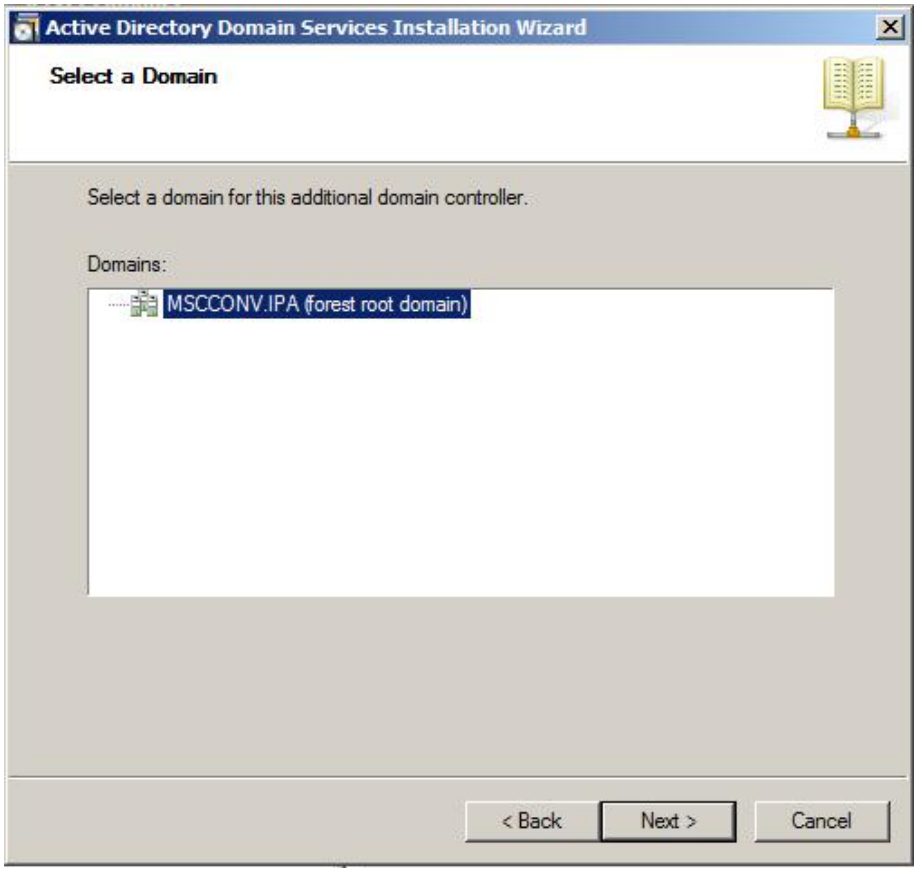
We then enter the FQDN for our domain and click Set to enter the credentials for this machine.


Active Directory Domain Services Installation Wizard
Network Credentials
Specify the name of the forest where the installation will occur and account credentials that have sufficient privileges to perform the installation.
Type the name of any domain in the forest where you plan to install this domain controller:
MSCCONV.IPA
Specify the account credentials to use to perform the installation:
My current logged on credentials (SERVER2\Administrator)
The current user credentials cannot be selected because they are local to this computer. A set of domain credentials is needed.
Alternate credentials:
Set...
More about who can install Active Directory Domain Services
< Back
Next >
Cancel

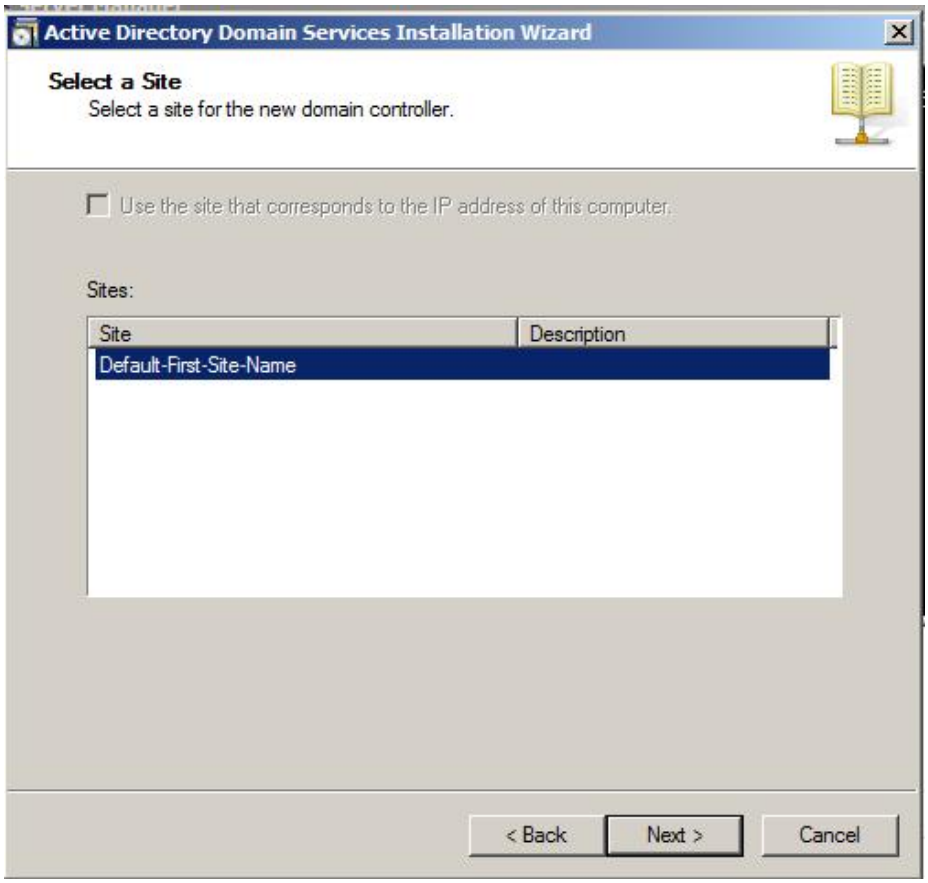
We then enter the Administrator credentials, and click next on the Wizard.


Active Directory Domain Services Installation Wizard
Network Credentials
Specify the name of the forest where the installation will occur and account credentials that have sufficient privileges to perform the installation.
Type the name of any domain in the forest where you plan to install this domain controller:
MSCCONV.IPA
Specify the account credentials to use to perform the installation:
My current logged on credentials (SERVER2\Administrator)
The current user credentials cannot be selected because they are local to this computer. A set of domain credentials is needed.
Alternate credentials:
MSCCONV.IPA\Administrator
Set...
More about who can install Active Directory Domain Services
< Back
Next >
Cancel

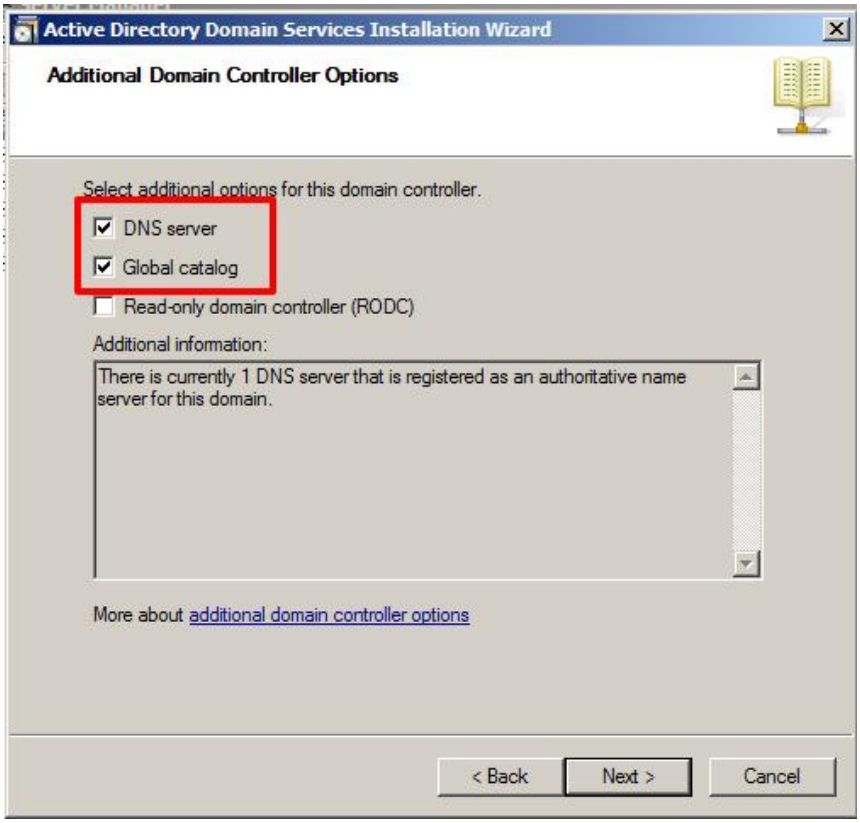
Our domain is then displayed as the domain for the additional domain controller.



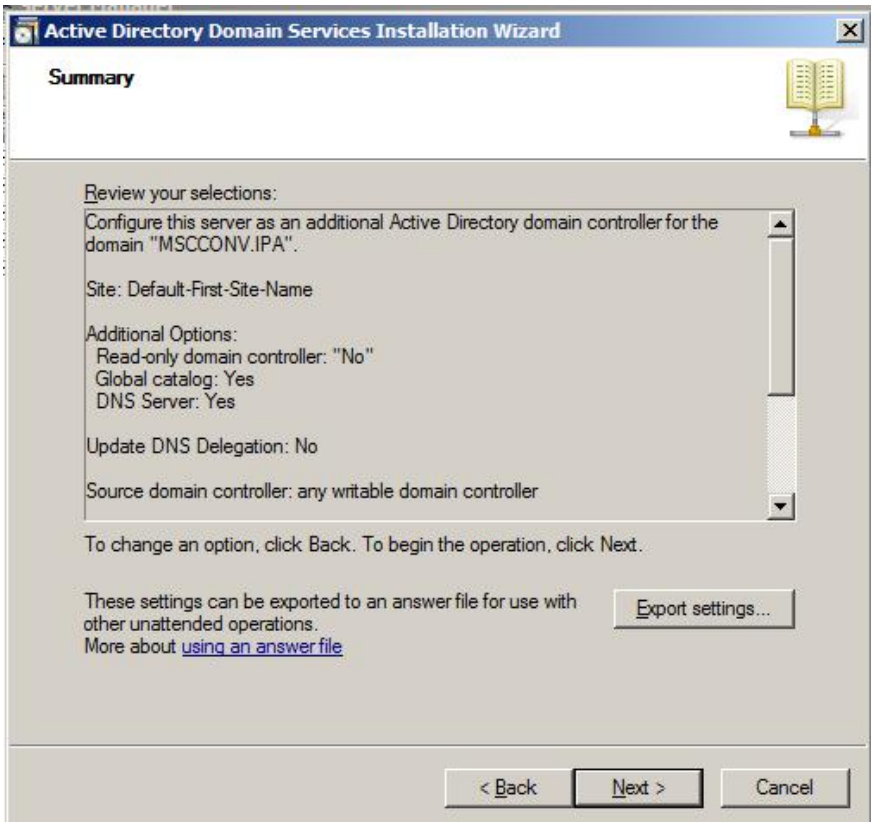
We accept the default site for the new domain controller.

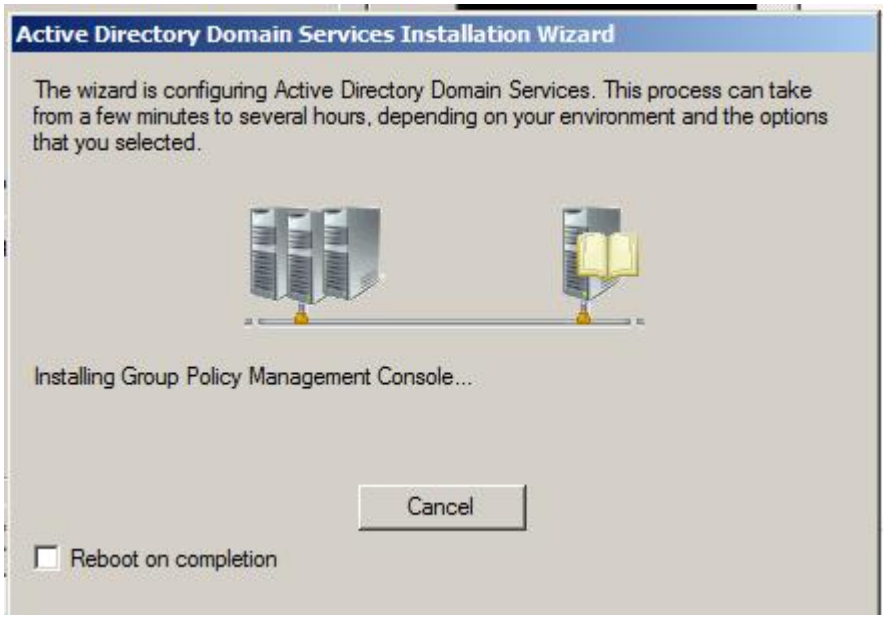


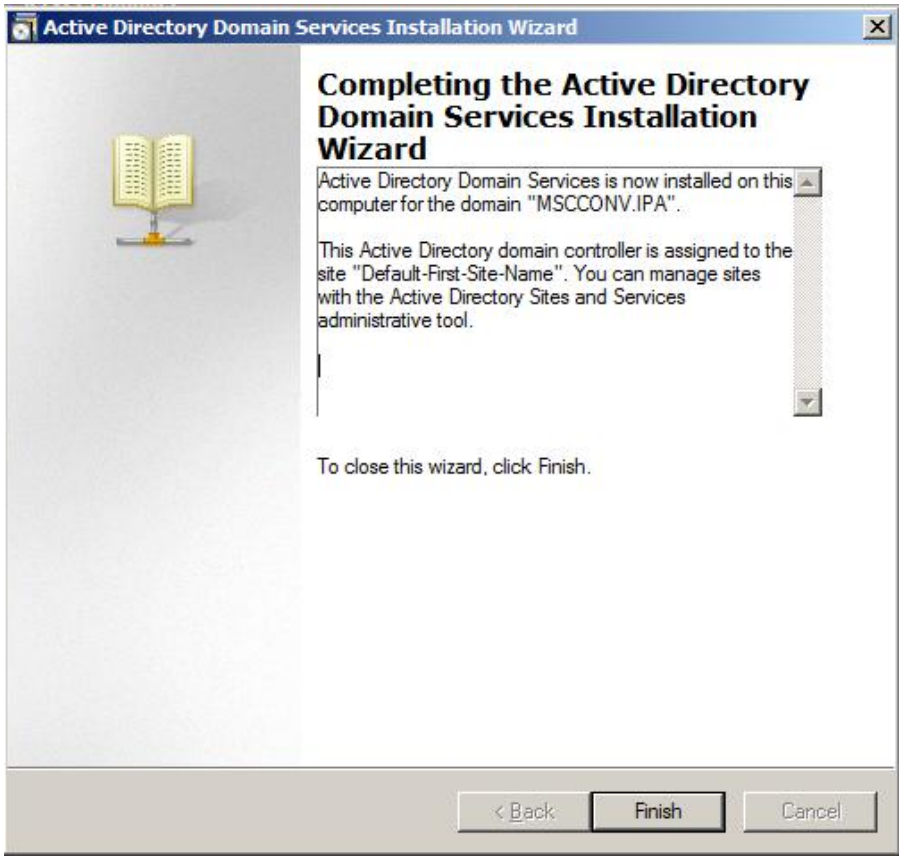
For the second domain controller additional options we select DNS Server and Global catalog.


Active Directory Domain Services Installation Wizard
Additional Domain Controller Options
Select additional options for this domain controller.
DNS server
Global catalog
Read-only domain controller (RODC)
Additional information:
There is currently 1 DNS server that is registered as an authoritative name server for this domain.
More about additional domain controller options
< Back
Next >
Cancel

The remaining steps of the Wizard are as per those described in Server1 above, which we follow to completion.


Active Directory Domain Services Installation Wizard
Summary
Review your selections:
Configure this server as an additional Active Directory domain controller for the domain "MSCCONV.IPA".
Site: Default-First-Site-Name
Additional Options:
Read-only domain controller: "No"
Global catalog: Yes
DNS Server: Yes
Update DNS Delegation: No
Source domain controller: any writable domain controller
To change an option, click Back. To begin the operation, click Next.
These settings can be exported to an answer file for use with other unattended operations.
More about using an answer file
Export settings...
< Back
Next >
Cancel

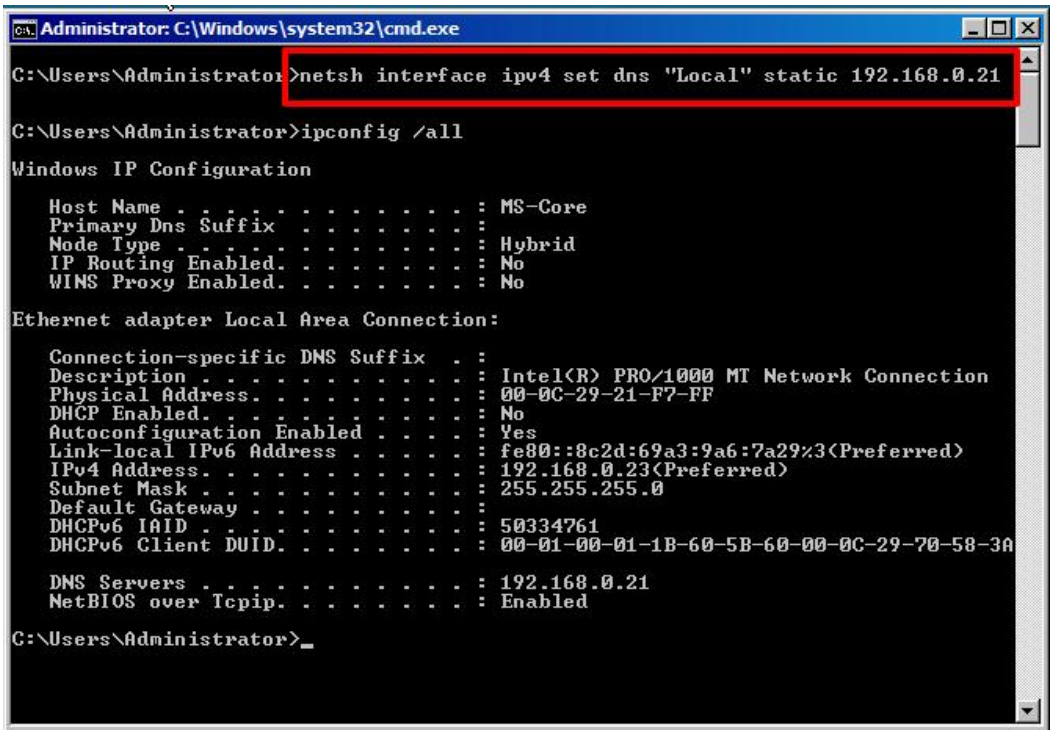

Active Directory Domain Services Installation Wizard
The wizard is configuring Active Directory Domain Services. This process can take from a few minutes to several hours, depending on your environment and the options that you selected.
Installing Group Policy Management Console...
Cancel
Reboot on completion


Active Directory Domain Services Installation Wizard
Completing the Active Directory Domain Services Installation Wizard
Active Directory Domain Services is now installed on this computer for the domain "MSCCONV.IPA".
This Active Directory domain controller is assigned to the site "Default-First-Site-Name". You can manage sites with the Active Directory Sites and Services administrative tool.
To close this wizard, click Finish.
< Back
Finish
Cancel

5.2.4 Subtask 4 - Setup MS-Core as a Member Server of the Tree

5.2.4.1 Step 1

As MS-Core has already been assigned a static IP address on our network, the first step in setting it u as a member server of our domain is to add the required DNS server, i.e. the IP address of Server1, to its network configuration. We do this from the command line by typing: 'netsh interface ipv4 set dns "Local" static 192.168.0.21'

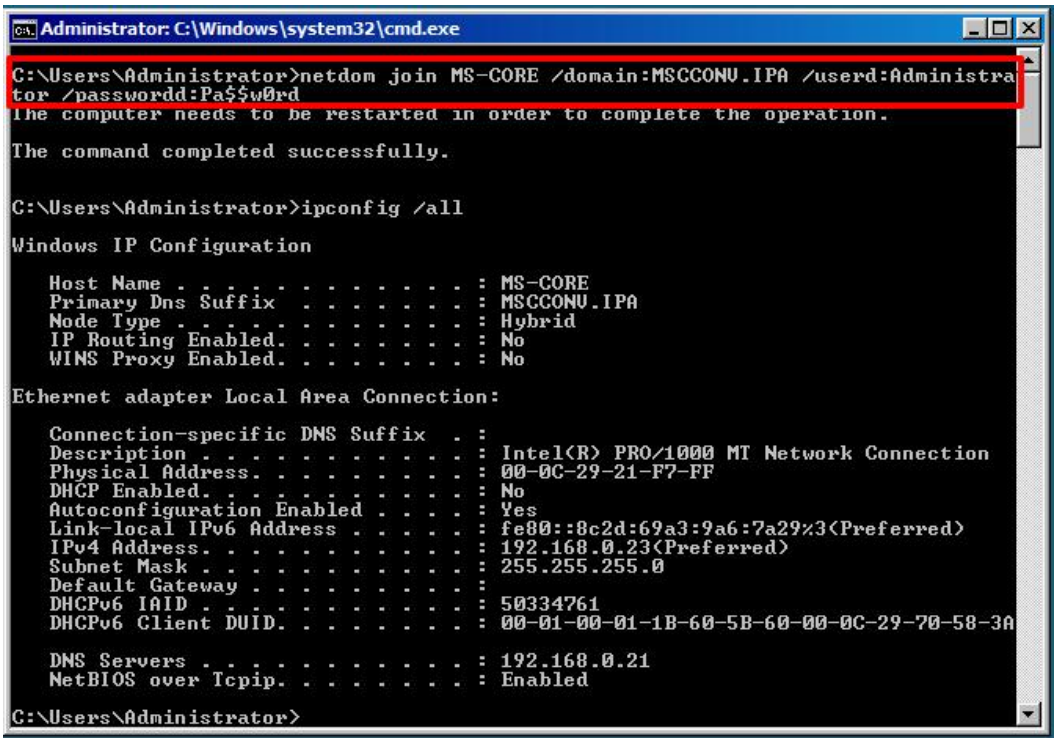

Administrator: C:\Windows\system32\cmd.exe
C:\Users\Administrator>netsh interface ipv4 set dns "Local" static 192.168.0.21
C:\Users\Administrator>ipconfig /all
Windows IP Configuration
Host Name . . . . . : MS-Core
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) PRO/1000 MT Network Connection
Physical Address. . . . . : 00-0C-29-21-F7-FF
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::8c2d:69a3:9a6:7a29%3(Preferred)
IPv4 Address. . . . . : 192.168.0.23(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
DHCPv6 IAID . . . . . : 50334761
DHCPv6 Client DUID. . . . . : 00-01-00-01-1B-60-5B-60-00-0C-29-70-58-3A
DNS Servers . . . . . : 192.168.0.21
NetBIOS over Tcpip. . . . . : Enabled
C:\Users\Administrator>

5.2.4.2 Step 2

We can then join MS-Core to the domain from the command line by typing:

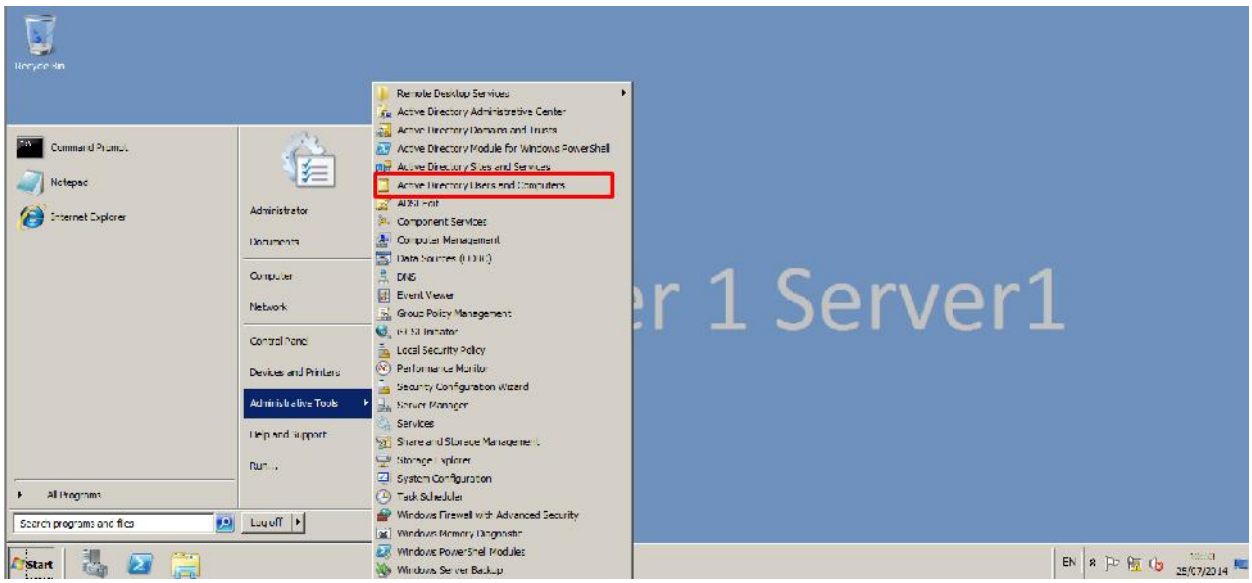
'netdom join MS-CORE /domain:MSCCONV.IPA /userd:Administrator /passwordd:Pa$$w0rd'

We can confirm the above configurations by typing ipconfig/all.

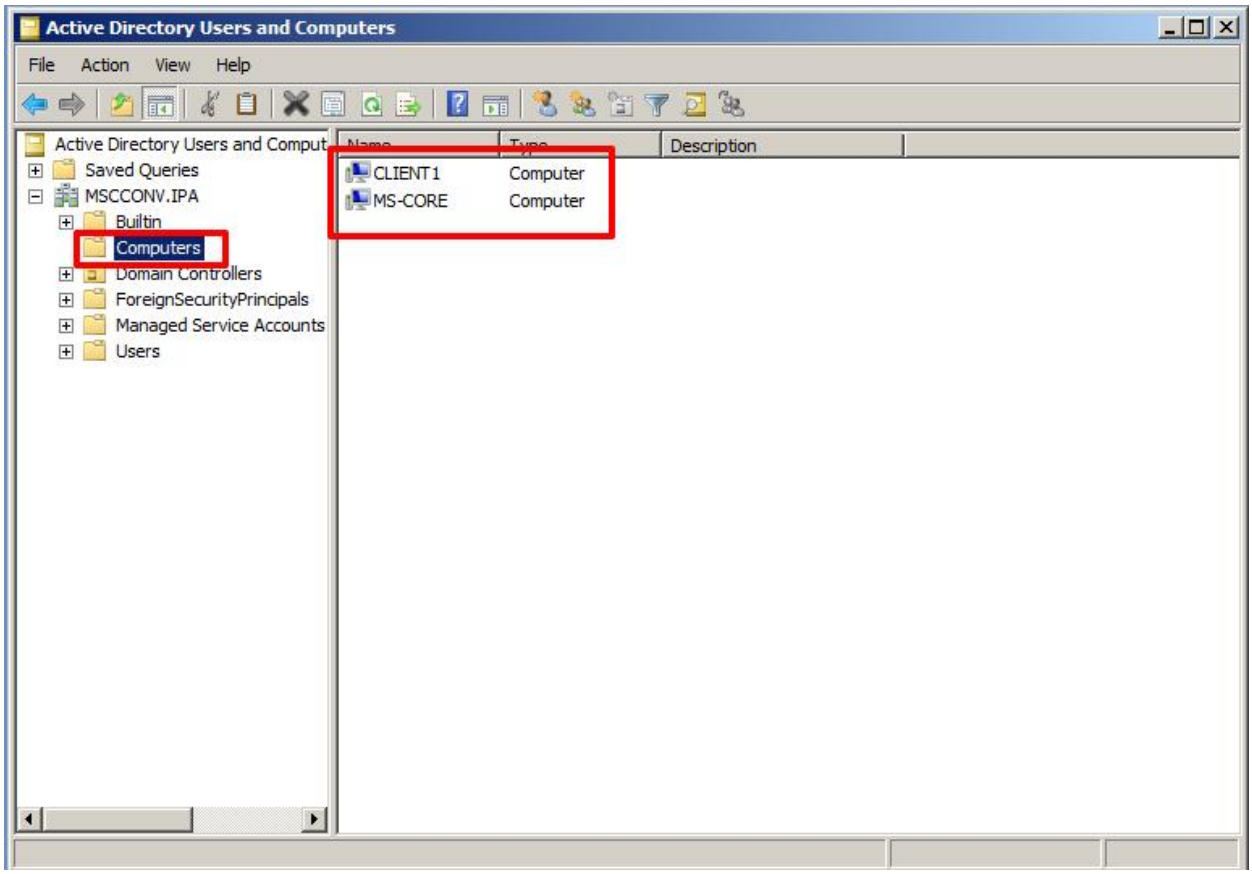

Administrator: C:\Windows\system32\cmd.exe
C:\Users\Administrator>netdom join MS-CORE /domain:MSCCONV.IPA /userd:Administrator /passwordd:Pa$$w0rd
The computer needs to be restarted in order to complete the operation.
The command completed successfully.
C:\Users\Administrator>ipconfig /all
Windows IP Configuration
Host Name . . . . . : MS-CORE
Primary Dns Suffix . . . . . : MSCCONV.IPA
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) PRO/1000 MT Network Connection
Physical Address. . . . . : 00-0C-29-21-F7-FF
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::8c2d:69a3:9a6:7a29%3(Preferred)
IPv4 Address. . . . . : 192.168.0.23(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
DHCPv6 IAID . . . . . : 50334761
DHCPv6 Client DUID. . . . . : 00-01-00-01-1B-60-5B-60-00-0C-29-70-58-3A
DNS Servers . . . . . : 192.168.0.21
NetBIOS over Tcpip. . . . . : Enabled
C:\Users\Administrator>

5.2.5 Confirm Configurations

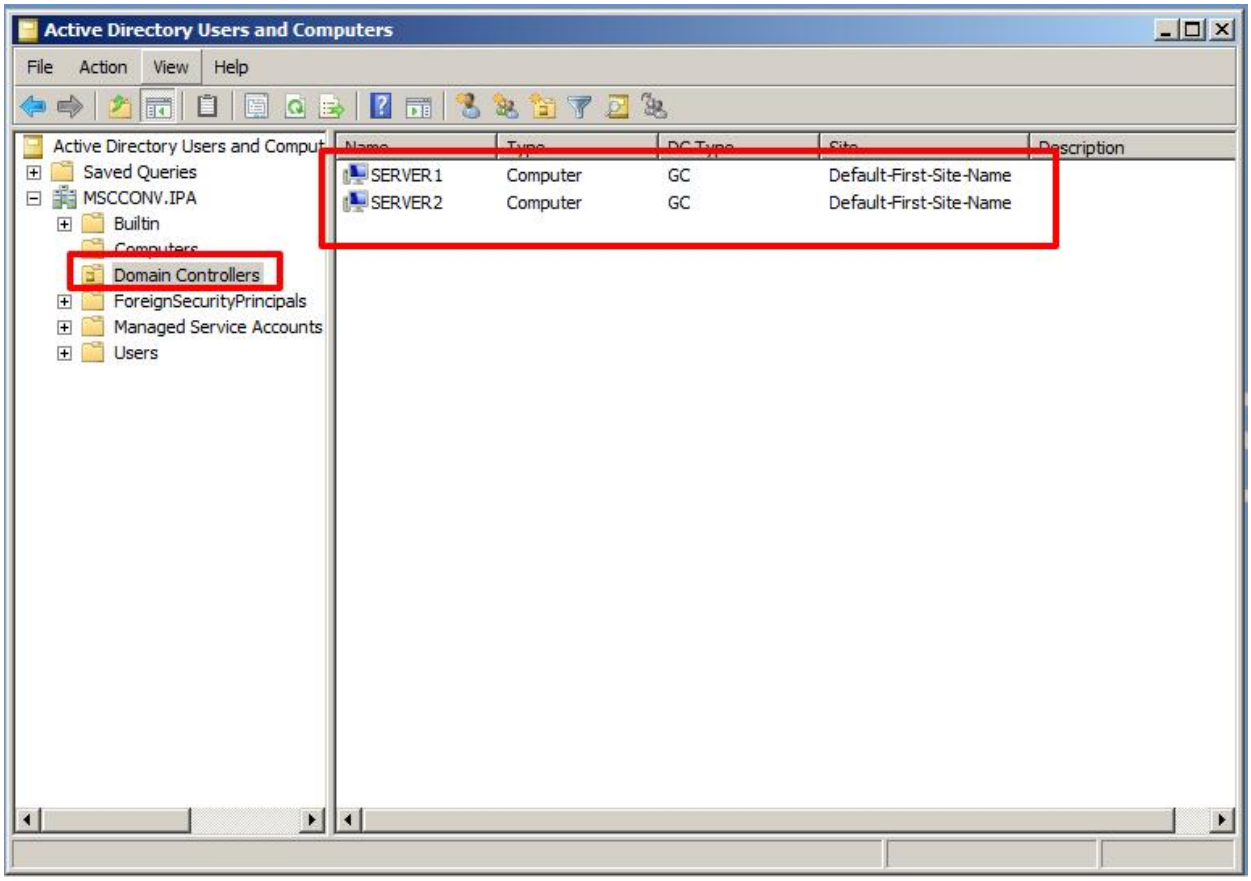
We can confirm that all of our configurations have taken effect, by clicking on Start, Administrative Tasks, Active Directory Users and Computers (AD UC) on the Server1 machine.



When we click on Computers we see that Client1 and MS-CORE are members of the domain.



When we click on Domain Controllers we see that Server1 and Server2 have been set up as domain controllers for this domain.



6. Part B - Task C

- *Install 2 additional hard disks of 150 GB, on Server1 and configure them to:*
- *Using these disks, use one to Mirror the operating system disk*
- *Using the remaining available space available, Create a Spanned volume which is to use all of the remaining free space on all disks.*

6.1 Preamble

In an enterprise environment, the installation of two additional hard disks on a server would involve the opening of the server case, and installing the correct SCSI drives. As the tasks described in this user manual were carried out using virtual machines, two additional hard drives were added in VMWare Workstation.

The mirroring of a disk is a form of Redundant Array of Independent Disks (RAID) technology. that is also known as RAID 1. RAID can be defined as "a data storage virtualization technology that combines multiple disk drive components into a logical unit for the purposes of data redundancy or performance improvement"[13].

When mirroring is implemented, data is written identically to two (or more) drives, thereby producing a "mirrored set". The read request is serviced by any of the drives containing the requested data, and this can improve read performance. However, write performance can be reduced because all drives must be updated; thus the write performance is determined by the slowest drive. The array continues to operate as long as at least one drive is functioning

The implementation of RAID can be managed either by dedicated computer hardware or by software. This ser manual describes a software solution, that is part of the operating system.

A spanned volume is "a dynamic volume consisting of disk space on more than one physical disk"[14]. If a simple volume exists that is not a system volume or boot volume, it can be extended across additional disks to create a spanned volume. A spanned volume can also be created in unallocated space on a dynamic disk.
You need at least two dynamic disks in addition to the startup disk to create a spanned volume. You can extend a spanned volume onto a maximum of 32 dynamic disks.

---

[13] Arpaci-Dusseau, R. H., & Arpaci-Dusseau, A. C. (2012). Operating Systems: Three Easy Pieces.
[14] http://technet.microsoft.com/en-us/library/cc772180.aspx. Accessed July 19, 2014.

6.2 System Requirements

6.2.1 - Disk Mirroring

- As advised by microsoft [15], in Windows Server 2008 R2, as long as there is one additional hard disk, it is possible to set up mirroring (RAID1) for the operating system volume using only tools already built into the operating system.
- No special software or hardware is required.
- Once the disk mirror is set up, the operating system and data will be present on both boot disks, and the system software will keep data and changes to the operating system (such as registry updates) in sync on both boot disks.
- If the primary boot disk should fail, the computer can switch over and boot from the secondary boot disk.

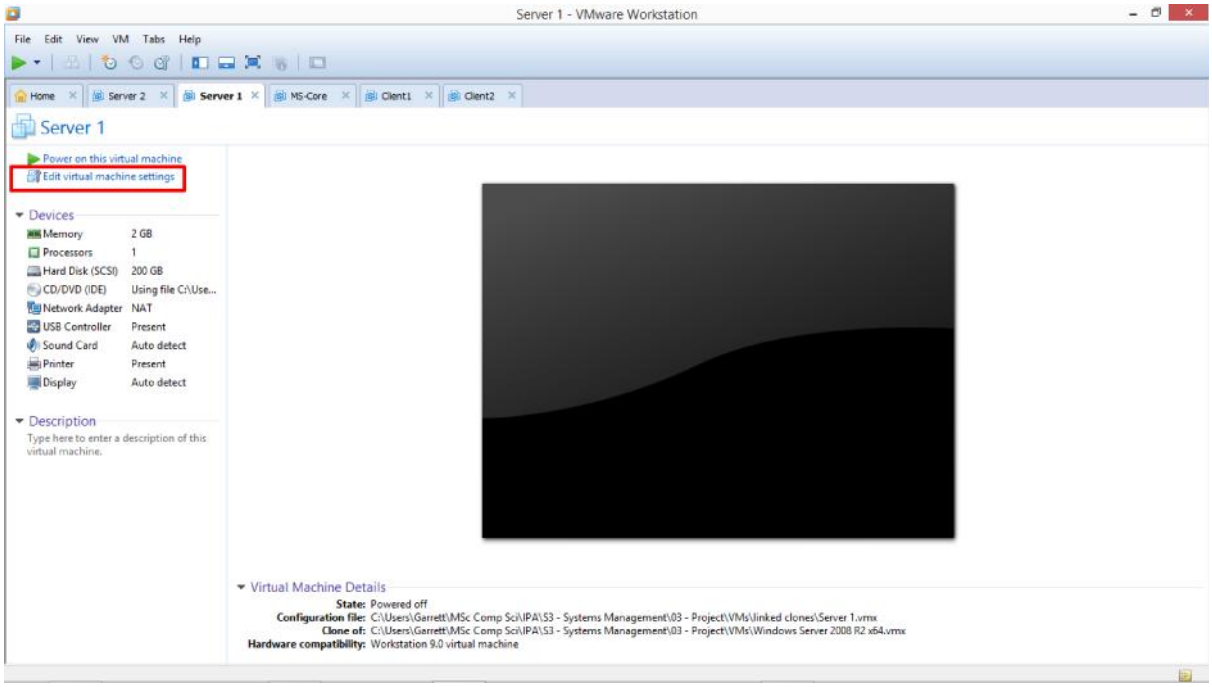
6.2.2 - Spanned Volume

- Microsoft note that simple volumes on dynamic disks can be extended on the same disk or set to span other disks, without restarting the computer, if more disk space is required [16].
- A simple volume can only be extended if the file system is NTFS.
- A volume that existed before the disk was upgraded to dynamic, can never be extended or spanned.
- It is not possible to extend a System or Boot volume.

6.3 Procedure

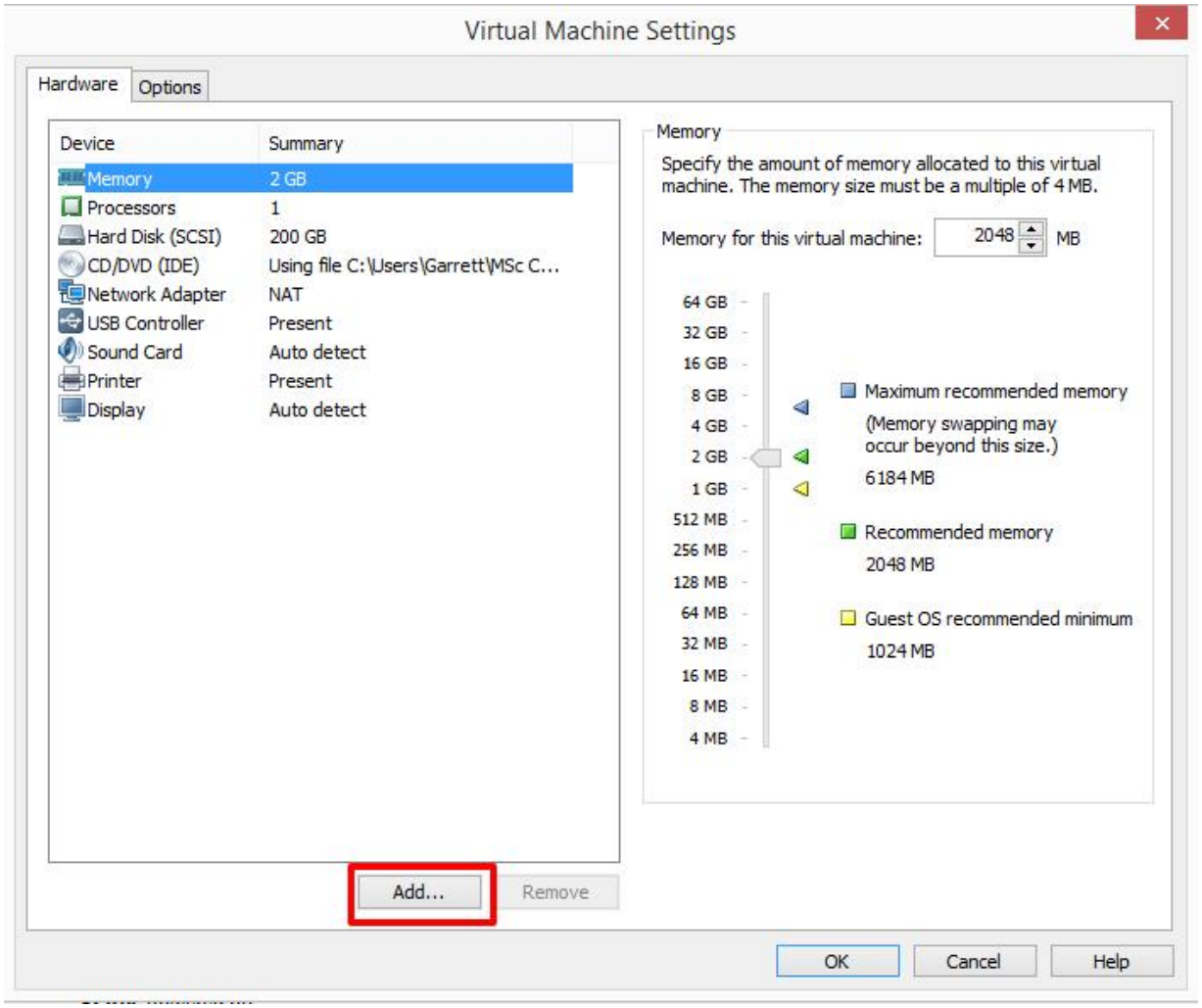
6.3.1 Subtask 1 - Install 2 Additional Hard Disks on Server 1

To add a hard disk (HDD) to the Server1 VM we right click on the VM and select Settings.

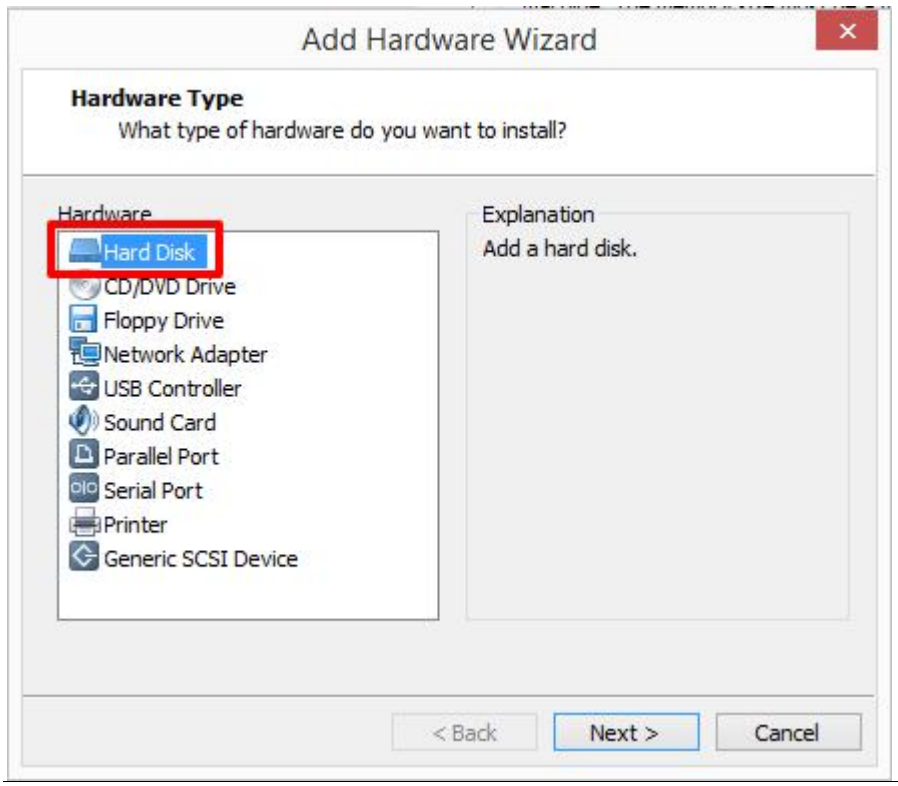


[15] http://www.microsoft.com/en-ie/download/details.aspx?id=23476. Accessed July 19, 2014.
[16] http://support.microsoft.com/kb/225551. Accessed July 19, 2014.

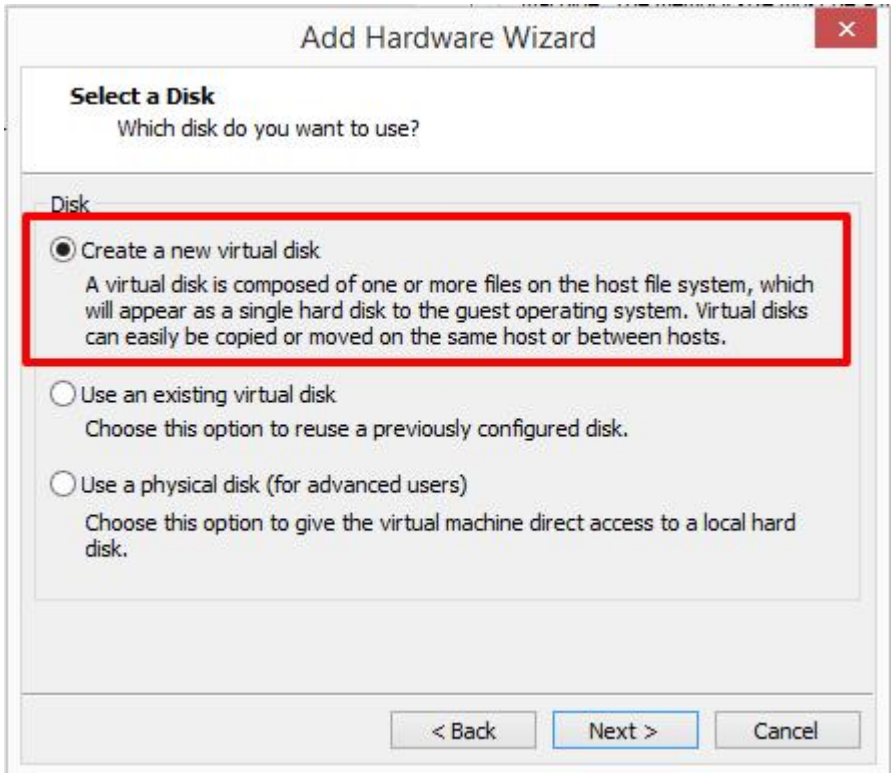
From the Hardware tab we click on Add.

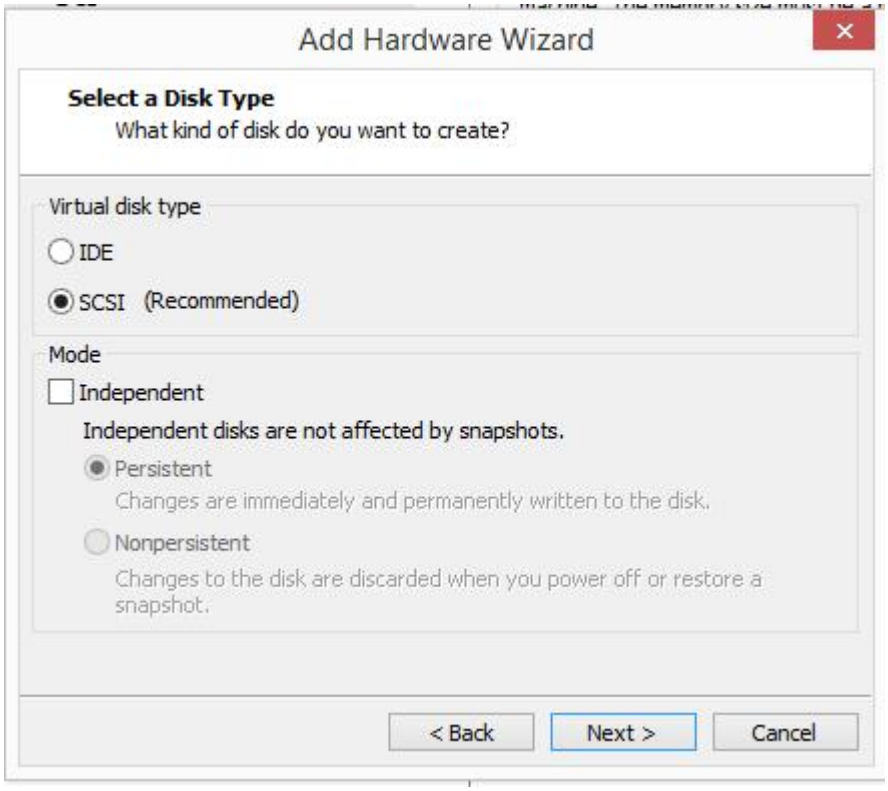


We then select Hard Disk and click Next.

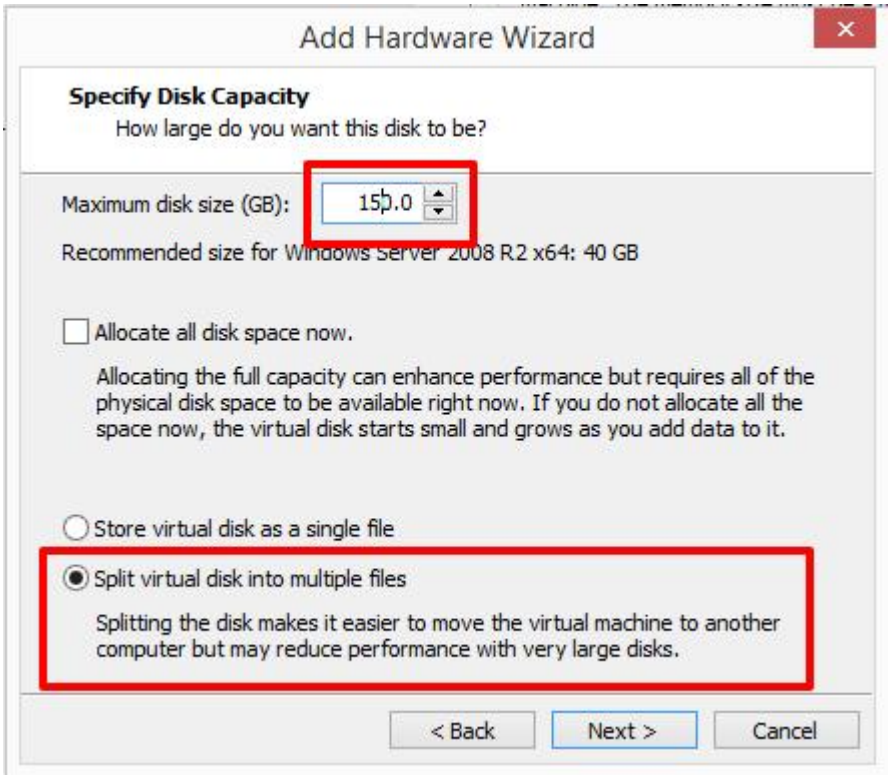


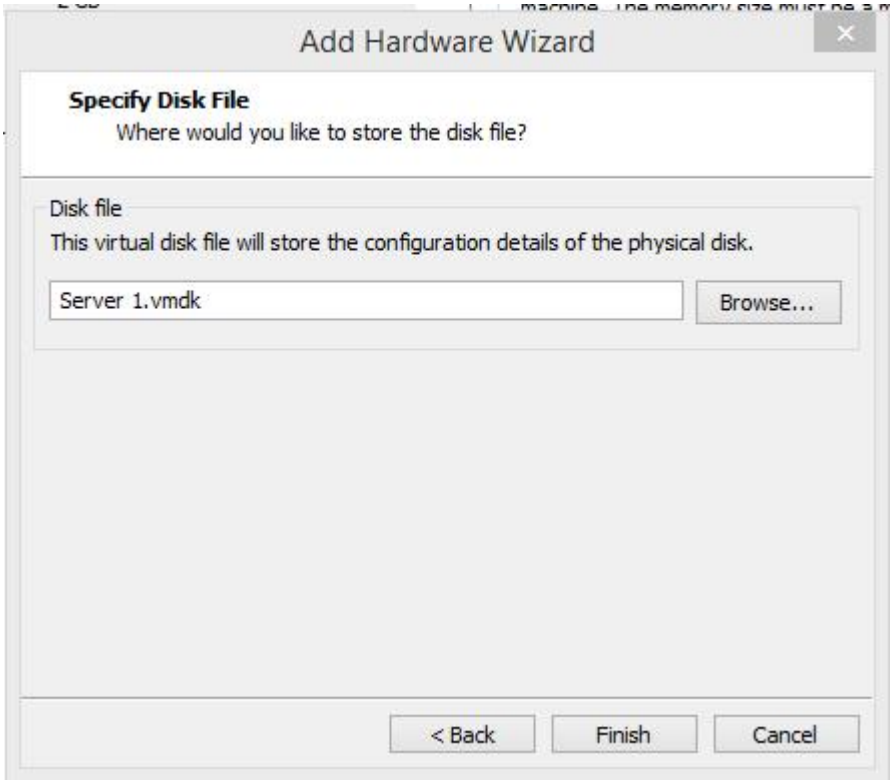
We then follow the steps as described in Appendix D hereunder for the setting up of a VM.


Add Hardware Wizard
Select a Disk
Which disk do you want to use?
Disk
Create a new virtual disk
A virtual disk is composed of one or more files on the host file system, which will appear as a single hard disk to the guest operating system. Virtual disks can easily be copied or moved on the same host or between hosts.
Use an existing virtual disk
Choose this option to reuse a previously configured disk.
Use a physical disk (for advanced users)
Choose this option to give the virtual machine direct access to a local hard disk.
< Back
Next >
Cancel

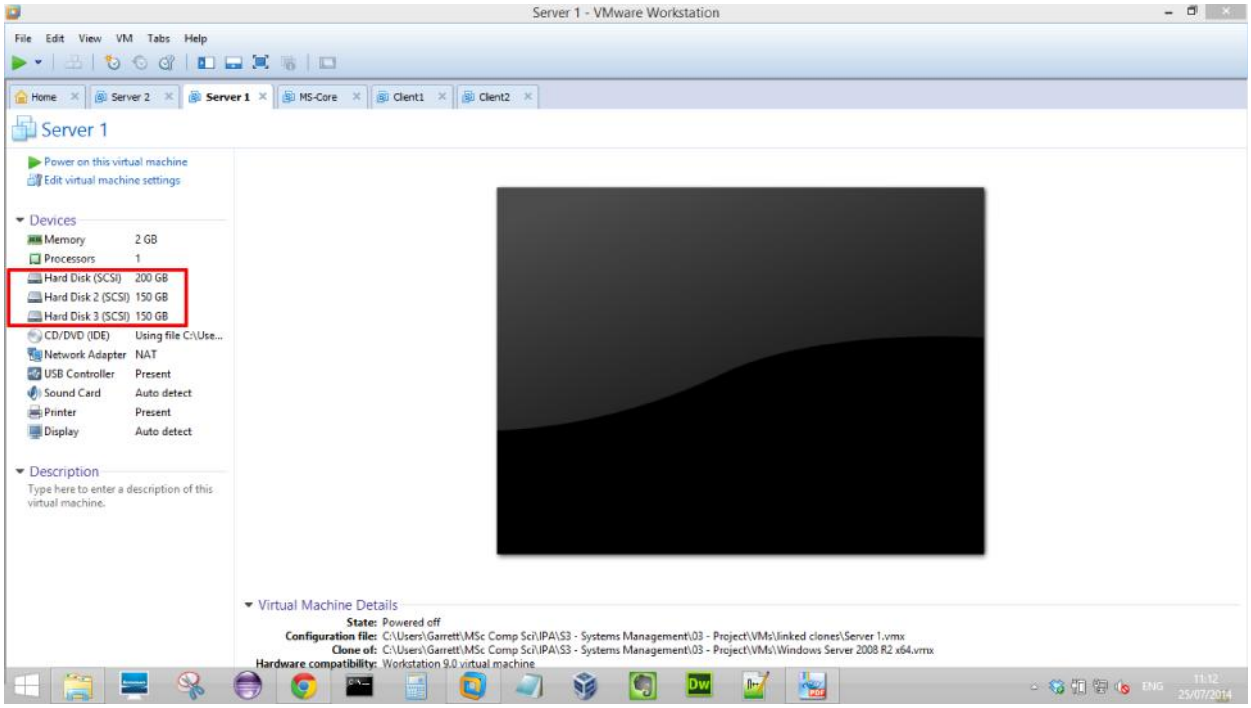

Add Hardware Wizard
Select a Disk Type
What kind of disk do you want to create?
Virtual disk type
IDE
SCSI (Recommended)
Mode
Independent
Independent disks are not affected by snapshots.
Persistent
Changes are immediately and permanently written to the disk.
Nonpersistent
Changes to the disk are discarded when you power off or restore a snapshot.
< Back
Next >
Cancel

At the Specify Disk Capacity window we enter 150GB as specified in the brief, for each additional HDD.


Add Hardware Wizard
Specify Disk Capacity
How large do you want this disk to be?
Maximum disk size (GB):
150.0
Recommended size for Windows Server 2008 R2 x64: 40 GB
Allocate all disk space now.
Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
< Back
Next >
Cancel

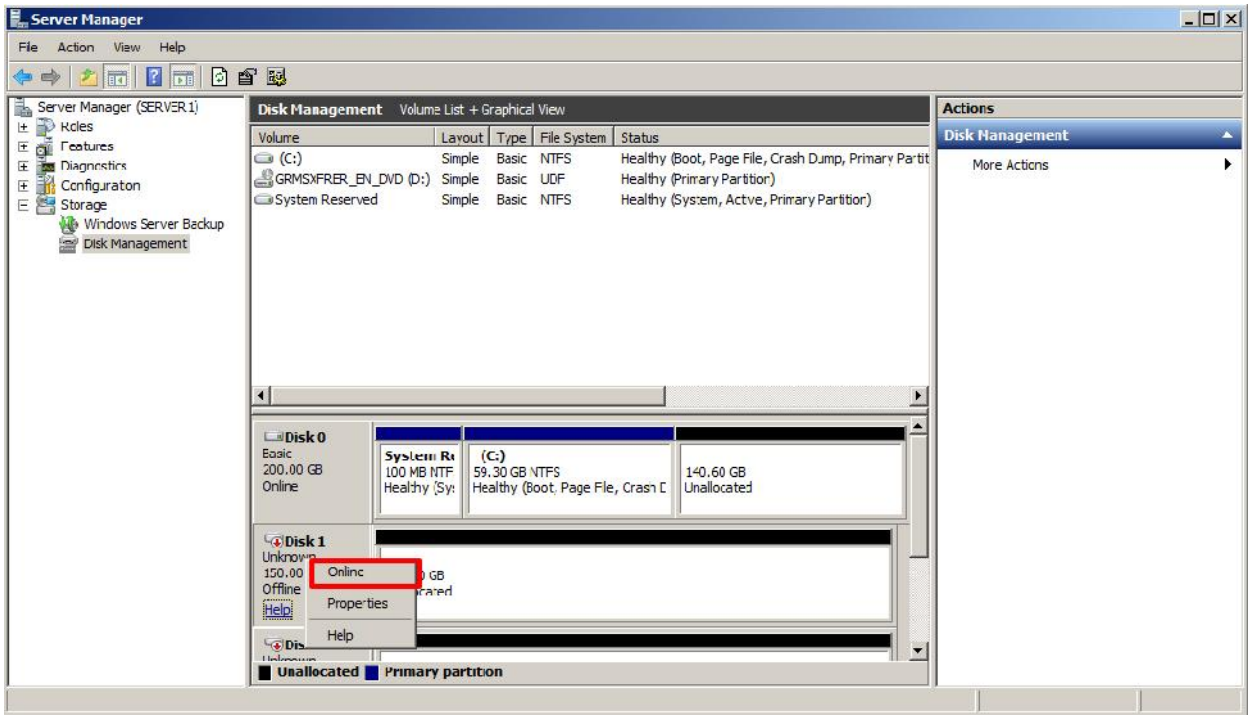


From VMWare Workstation we can then see that the 2 additional Hard disks have been added.

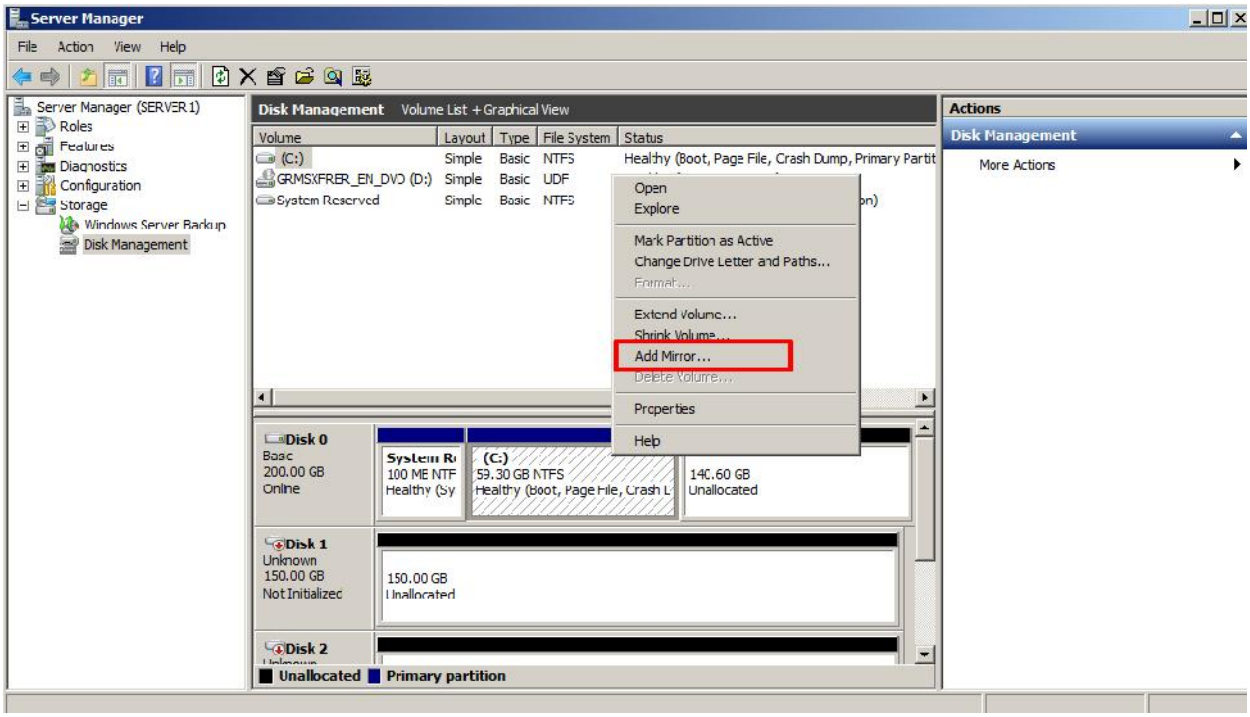

Server 1 - VMware Workstation
File Edit View VM Tabs Help
Home Server 2 Server 1 MS-Core Client1 Client2
Server 1
Power on this virtual machine
Edit virtual machine settings
Devices
Memory 2 GB
Processors 1
Hard Disk (SCSI) 200 GB
Hard Disk 2 (SCSI) 150 GB
Hard Disk 3 (SCSI) 150 GB
CD/DVD (IDE) Using file C:\Use...
Network Adapter NAT
USB Controller Present
Sound Card Auto detect
Printer Present
Display Auto detect
Description
Type here to enter a description of this virtual machine.
Virtual Machine Details
State: Powered off
Configuration file: C:\Users\Garrett\MSc Comp Sci\IPA\S3 - Systems Management\03 - Project\VMs\linked clones\Server 1.vmx
Clone of: C:\Users\Garrett\MSc Comp Sci\IPA\S3 - Systems Management\03 - Project\VMs\Windows Server 2008 R2 x64.vmx
Hardware compatibility: Workstation 9.0 virtual machine

6.3.2 Subtask 2 - Use an Additional Hard Disk to Mirror the OS Disk

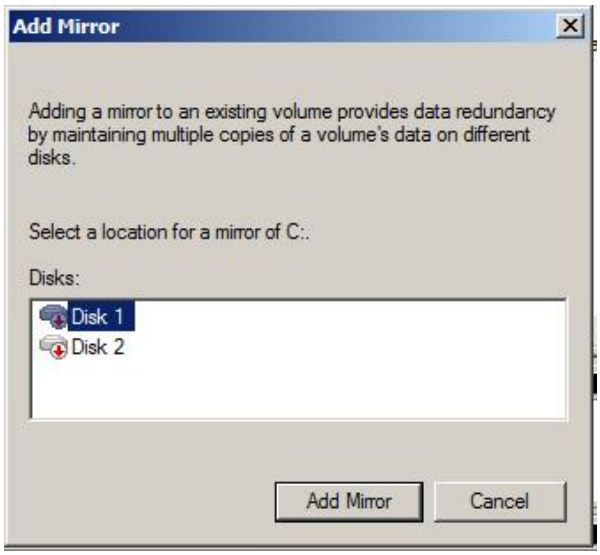
To manage HDDs on Server1, from Server Manager we select Storage, Disk Management. We then right click on each of the newly added HDDs and click Online to make them available.



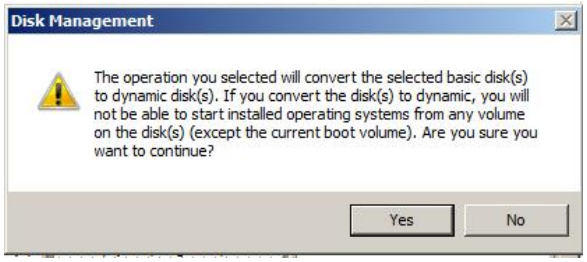
To mirror the OS to one of our newly added disks, we right click the partition where the OS is installed and select Add Mirror.



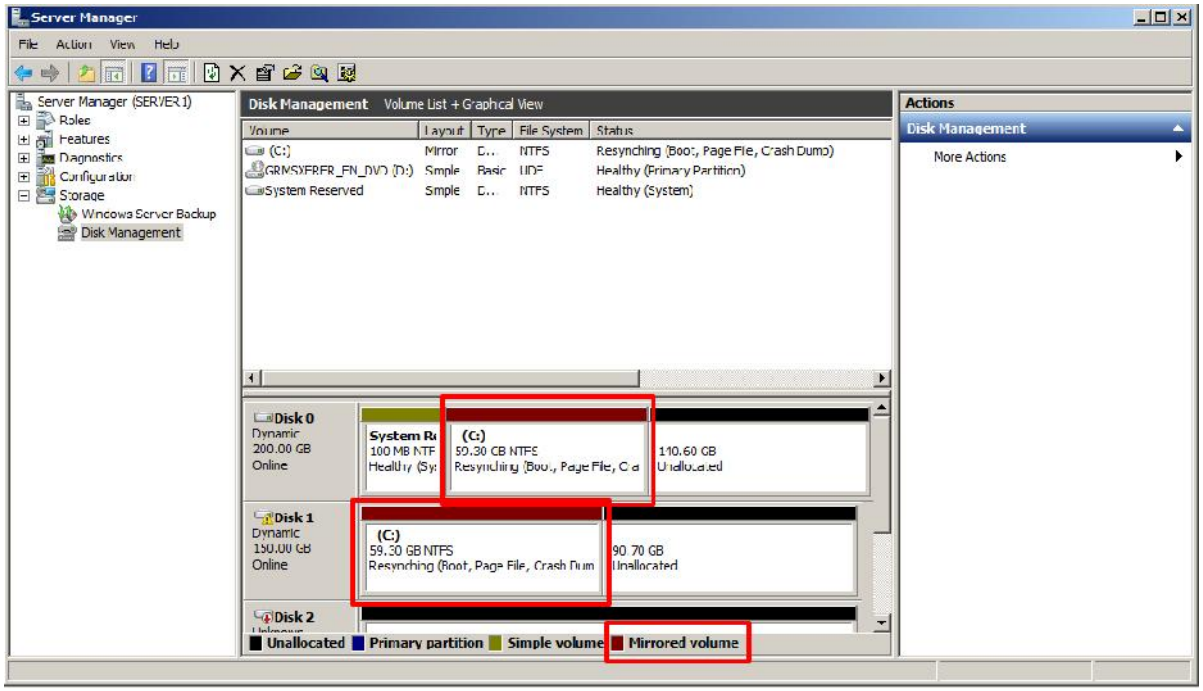
We then select the disk we wish to mirror the OS, in our case we select Disk 1.


Add Mirror
Adding a mirror to an existing volume provides data redundancy by maintaining multiple copies of a volume's data on different disks.
Select a location for a mirror of C:.
Disks:
Disk 1
Disk 2
Add Mirror
Cancel

The resultant warning message advises us that the disk will be changed to a dynamic disk, we will not be able to start any more OS's from the HDD other than the current boot volume.

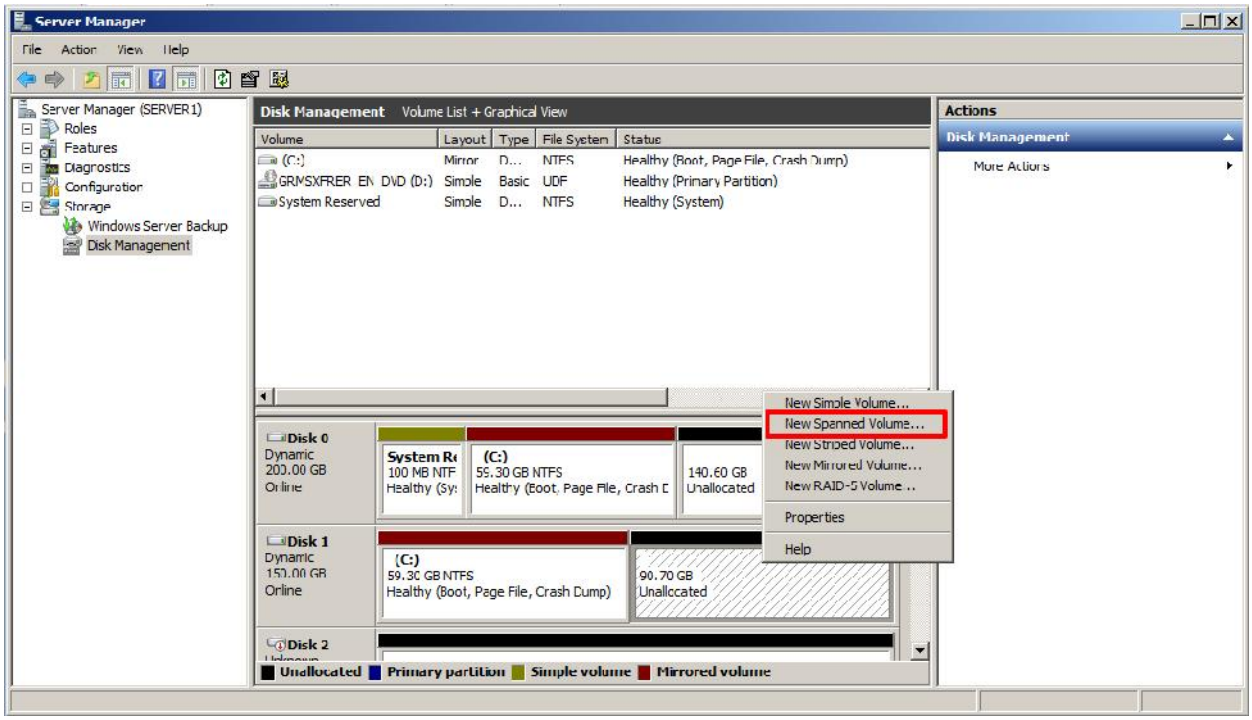

Disk Management
The operation you selected will convert the selected basic disk(s) to dynamic disk(s). If you convert the disk(s) to dynamic, you will not be able to start installed operating systems from any volume on the disk(s) (except the current boot volume). Are you sure you want to continue?
Yes
No

We then see that the two partitions are synced, coloured maroon to indicate mirrored volumes.



6.3.3 Subtask 3 - Create a Spanned Volume to Use Remaining Free Disk Space

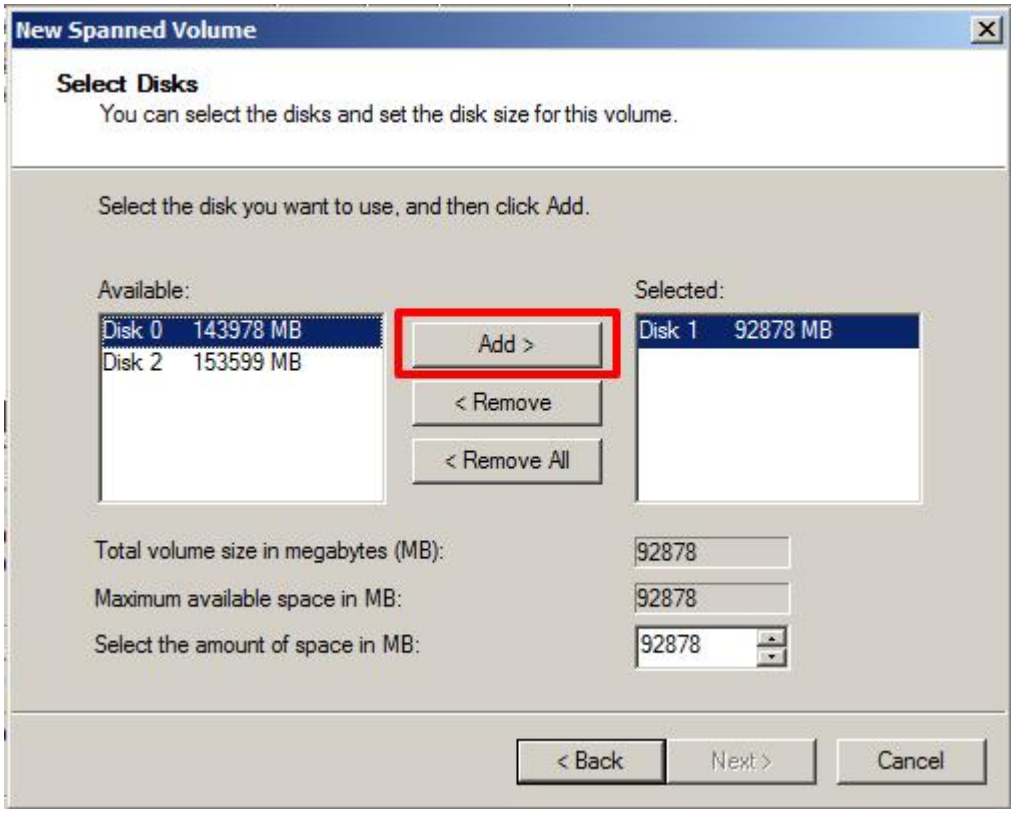
In order to create a spanned volume that uses the remaining available disk space, we right click on any of the unallocated space and select New Spanned Volume.



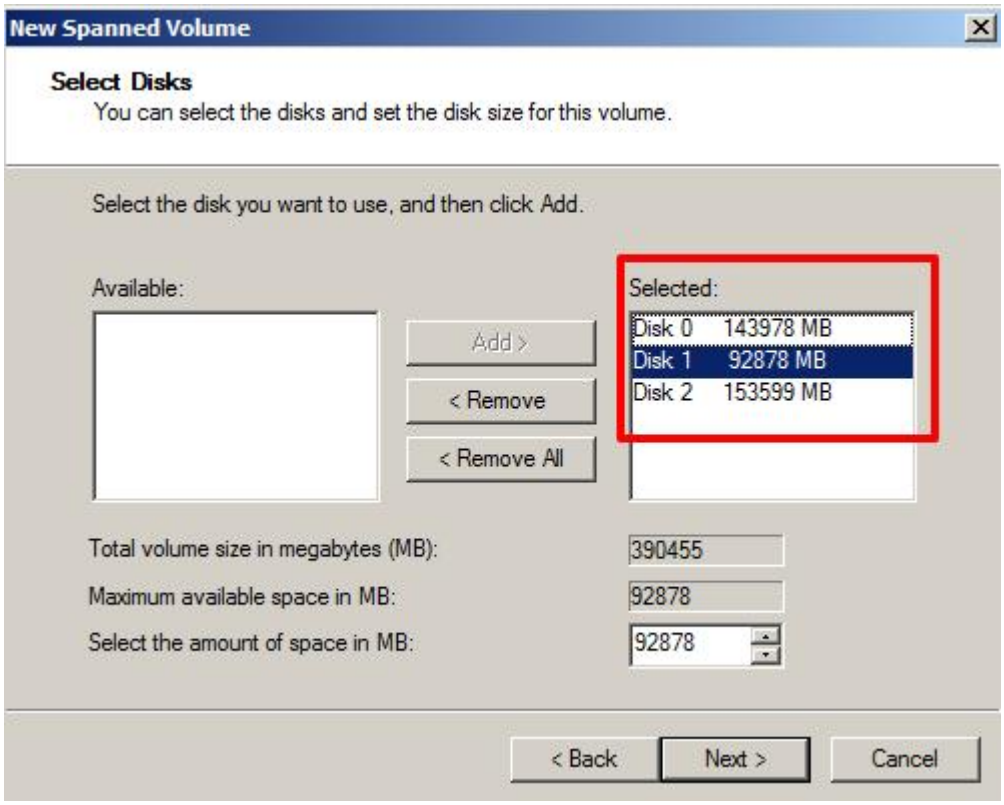
This opens the New Spanned Volume Wizard.

New Spanned Volume
Welcome to the New Spanned Volume Wizard
This wizard helps you create spanned volumes on disks.
A spanned volume is made up of disk space on more than one disk. Create a spanned volume if you need a volume that is too large for a single disk. You can extend a spanned volume by adding free space from another disk.
To continue, click Next.
< Back
Next >
Cancel

We can then see the unallocated space on all disks, and we select each of the disks and click Add to include it on our spanned volume.



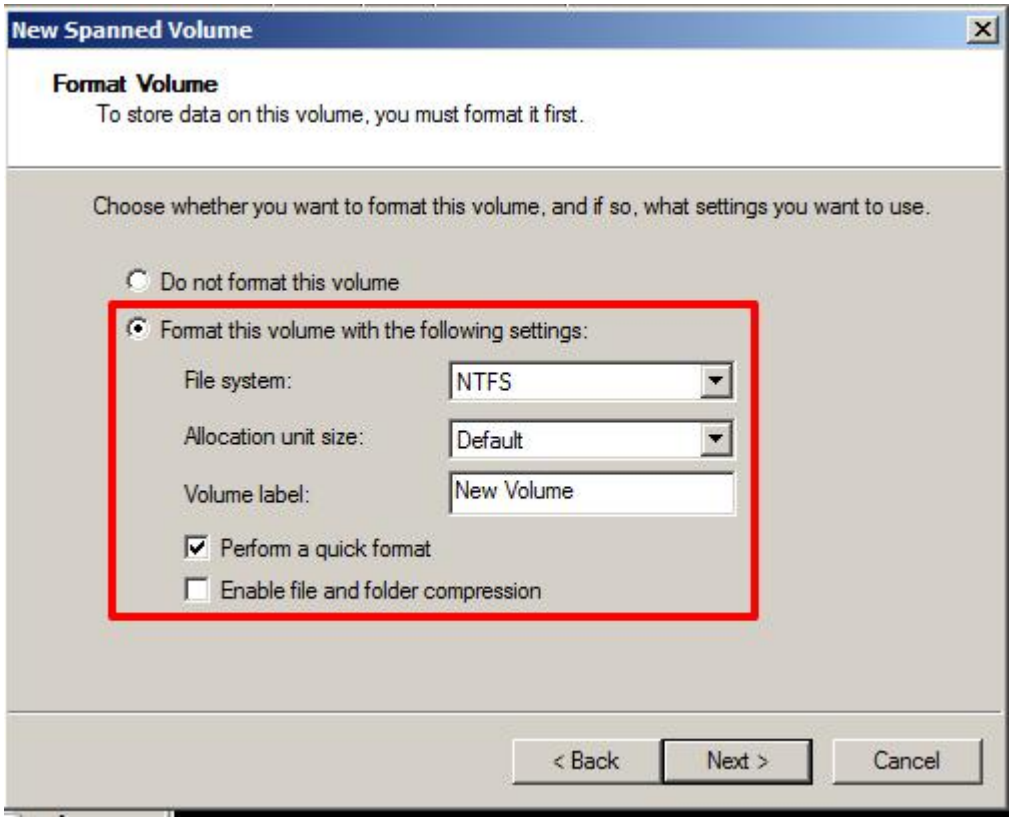
Once the available space has been selected we click Next.


New Spanned Volume
Select Disks
You can select the disks and set the disk size for this volume.
Select the disk you want to use, and then click Add.
Available:
Add >
< Remove
< Remove All
Selected:
Disk 0 143978 MB
Disk 1 92878 MB
Disk 2 153599 MB
Total volume size in megabytes (MB): 390455
Maximum available space in MB: 92878
Select the amount of space in MB: 92878
< Back
Next >
Cancel

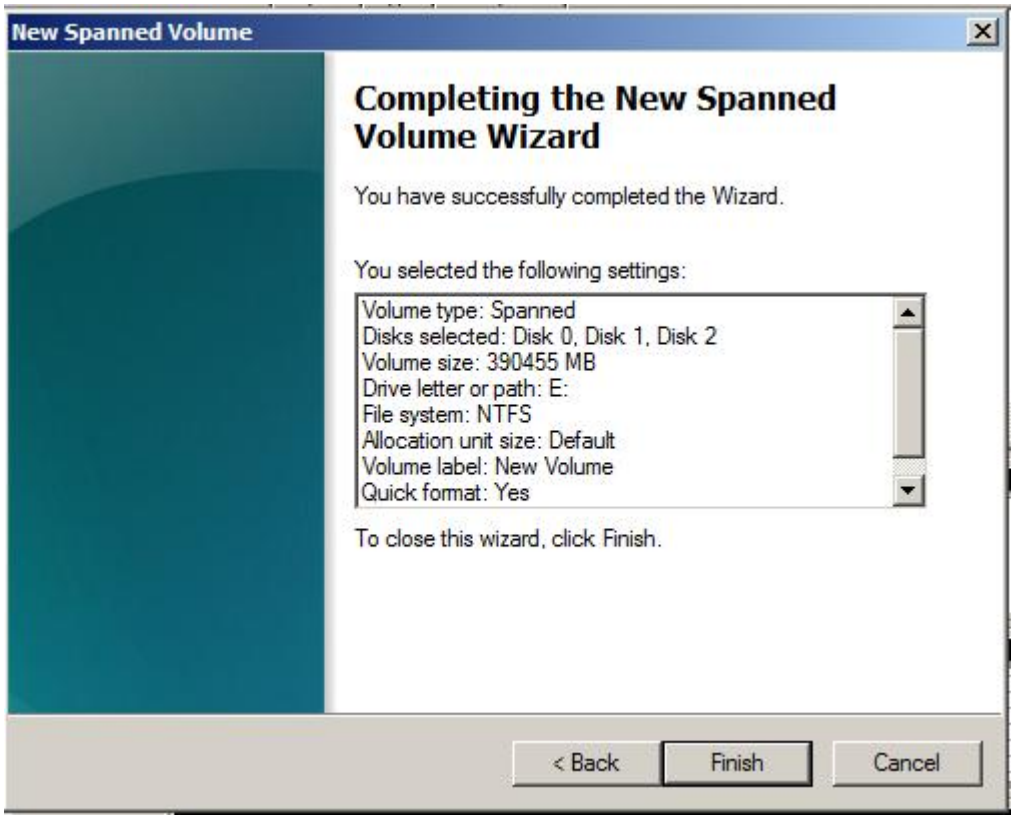
We then assign a drive letter to the spanned volume.

New Spanned Volume
Assign Drive Letter or Path
For easier access, you can assign a drive letter or drive path to your volume.
Assign the following drive letter: E
Mount in the following empty NTFS folder:
Browse...
Do not assign a drive letter or drive path
< Back
Next >
Cancel

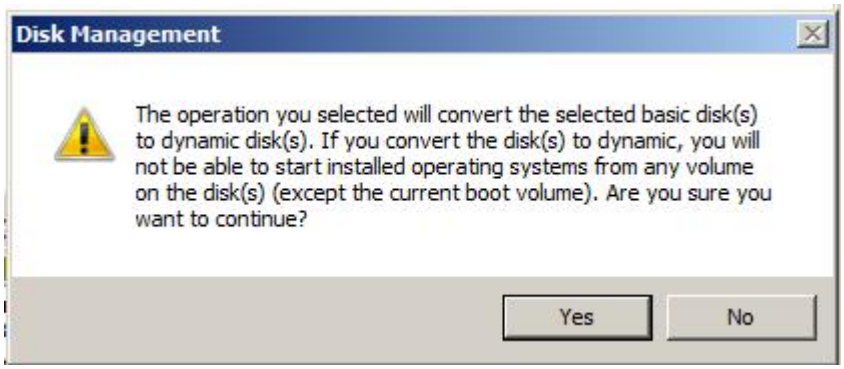
The next window allows us to format the drive, and we select NTFS file system, and quick format.


New Spanned Volume
Format Volume
To store data on this volume, you must format it first.
Choose whether you want to format this volume, and if so, what settings you want to use.
Do not format this volume
Format this volume with the following settings:
File system:
NTFS
Allocation unit size:
Default
Volume label:
New Volume
Perform a quick format
Enable file and folder compression
< Back
Next >
Cancel

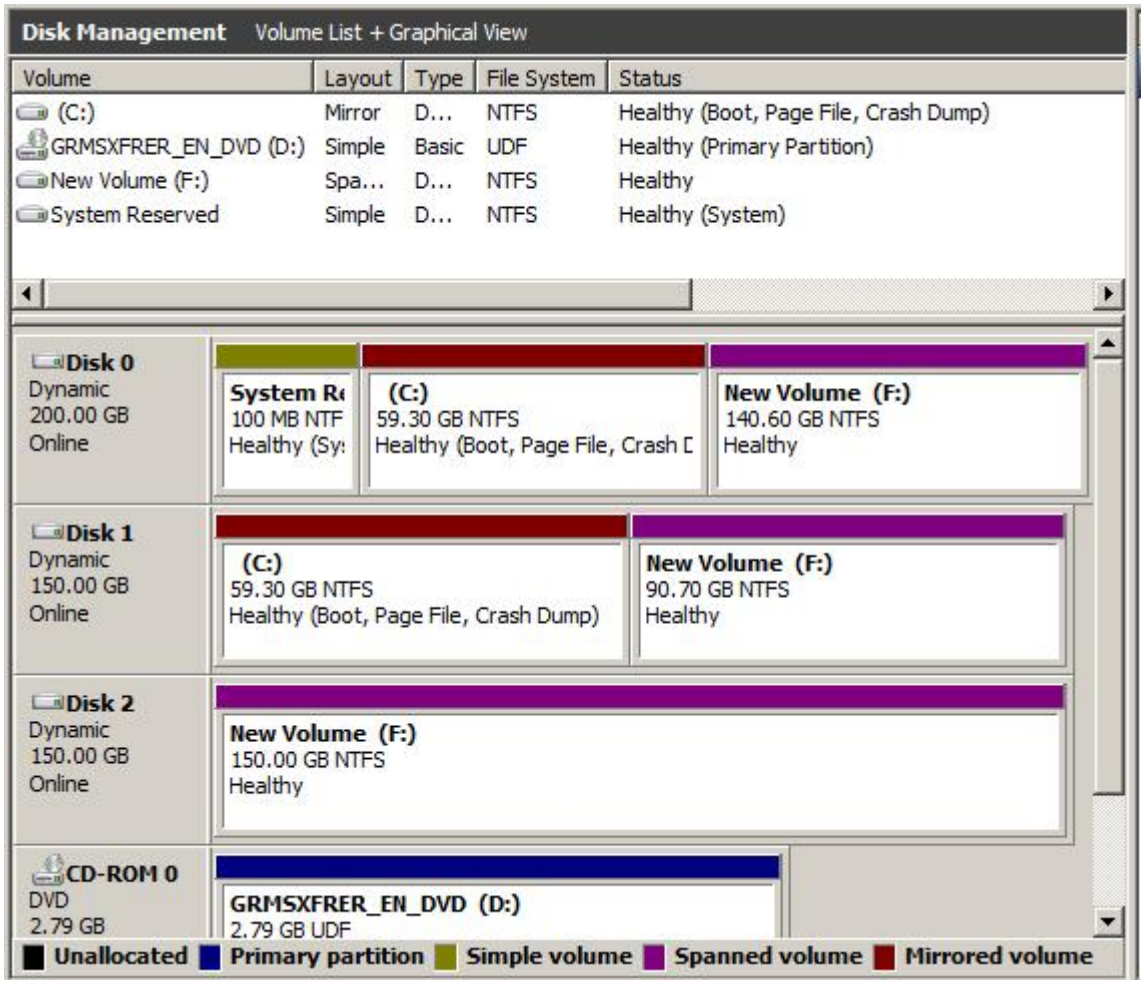
We then click Finish to complete the Wizard.


New Spanned Volume
Completing the New Spanned Volume Wizard
You have successfully completed the Wizard.
You selected the following settings:
Volume type: Spanned
Disks selected: Disk 0, Disk 1, Disk 2
Volume size: 390455 MB
Drive letter or path: E:
File system: NTFS
Allocation unit size: Default
Volume label: New Volume
Quick format: Yes
To close this wizard, click Finish.
< Back
Finish
Cancel

A similar warning message to when mirroring is displayed, which we accept and then spanning is carried out.


Disk Management
The operation you selected will convert the selected basic disk(s) to dynamic disk(s). If you convert the disk(s) to dynamic, you will not be able to start installed operating systems from any volume on the disk(s) (except the current boot volume). Are you sure you want to continue?
Yes
No

Upon completion of the above tasks we can see our mirrored disks coloured maroon, and our spanned volume in purple across the three disks.



7. Part B - Task D

- *Within Active Directory, create the following organisational unit structure:*
- *Parent OU called IPA containing:*
  - *Two child OUs called Marketing and IT.*
  - *IT OU to contain 2 sub OUs called Dublin and Belfast.*
- *Identify any method of creating users via a TUI environment, outline advantages accordingly.*
- *Using a method of your choice, Create 5 users in the IPA OU called user1 to user10 (first name only) using the default Pa$$w0rd.*
- *Create 3 users in sales called user11 to user15, 3 users in Dublin called user16 to user18, and 2 users in Belfast called user19 and user20.*
- *Users are not to change their passwords at first login and are to have 24 hour logins enabled, Monday to Friday only.*

7.1 Preamble

According to Microsoft, the Active Directory Domain Services role allows us to "create a scalable, secure, and manageable infrastructure for user and resource management."[17]. Simply described, it centralise network management so that most administrative tasks can be implemented and controlled from one of the Active Directory Domain Controllers. These tasks can also be applied to the whole network at once rather than having to be applied on each individual AD member, as we will illustrate hereunder.

An organisational unit (OU) is a subdivision within an Active Directory. An organisational unit is a logical container into which users, groups, computers and other OUs can be placed. One of the benefits of An Active Directory OU structure is often cited [18] as being that it can reflect the logical structure of an organisation by modelling the organisational chart, depicting employees and their respective departments. Organisational units are created to configure objects within the organisational unit and delegate administrative control. An OU is the smallest unit to which a Group Policy can be linked, or over which administrative authority can be delegated.

The configuration and implementation of Group Policies in Active Directory is described in Section 8: Part B - Task E below.

The main GUI for administration of OUs is the Active Directory Users and Computers (ADUC) Microsoft Management Console (MMC) snap-in. From here, we will illustrate below how to create OUs, new users and groups and how to apply Group Policies.

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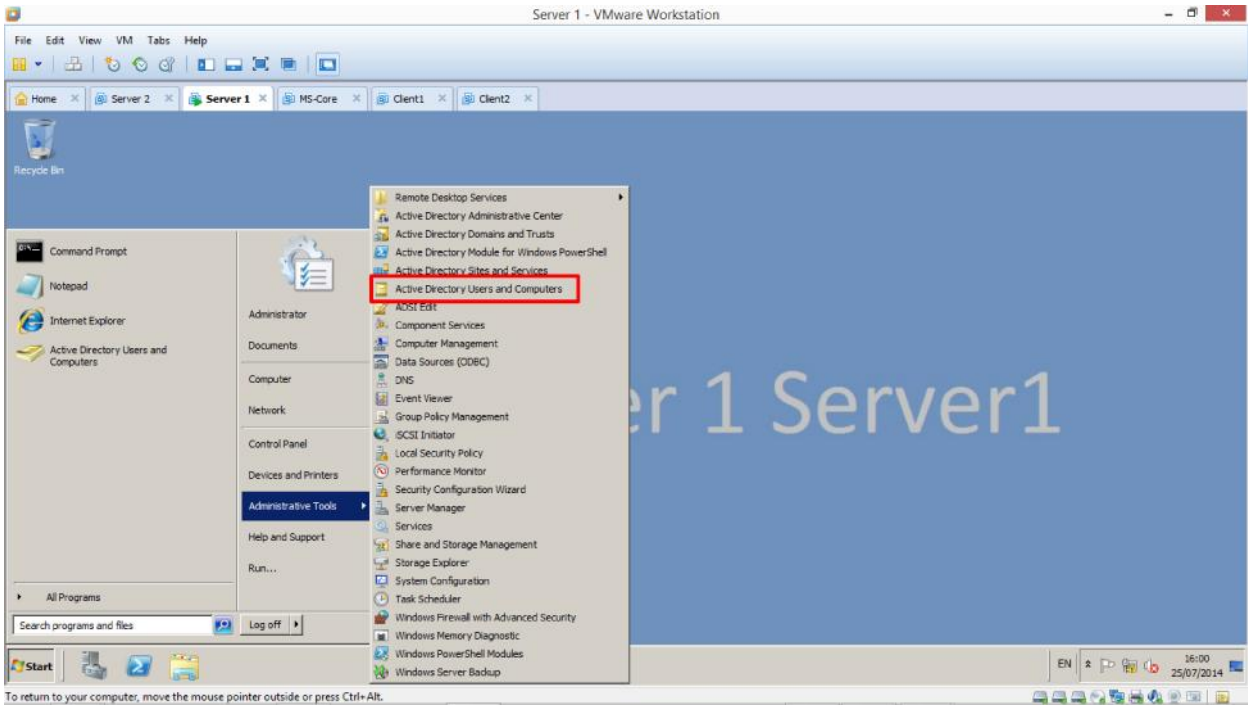
[17] http://technet.microsoft.com/en-us/library/hh831484.aspx. Accessed July 19, 2014.
[18] T.Brett, Introduction to Active Directory Services, June 10 , 2014.

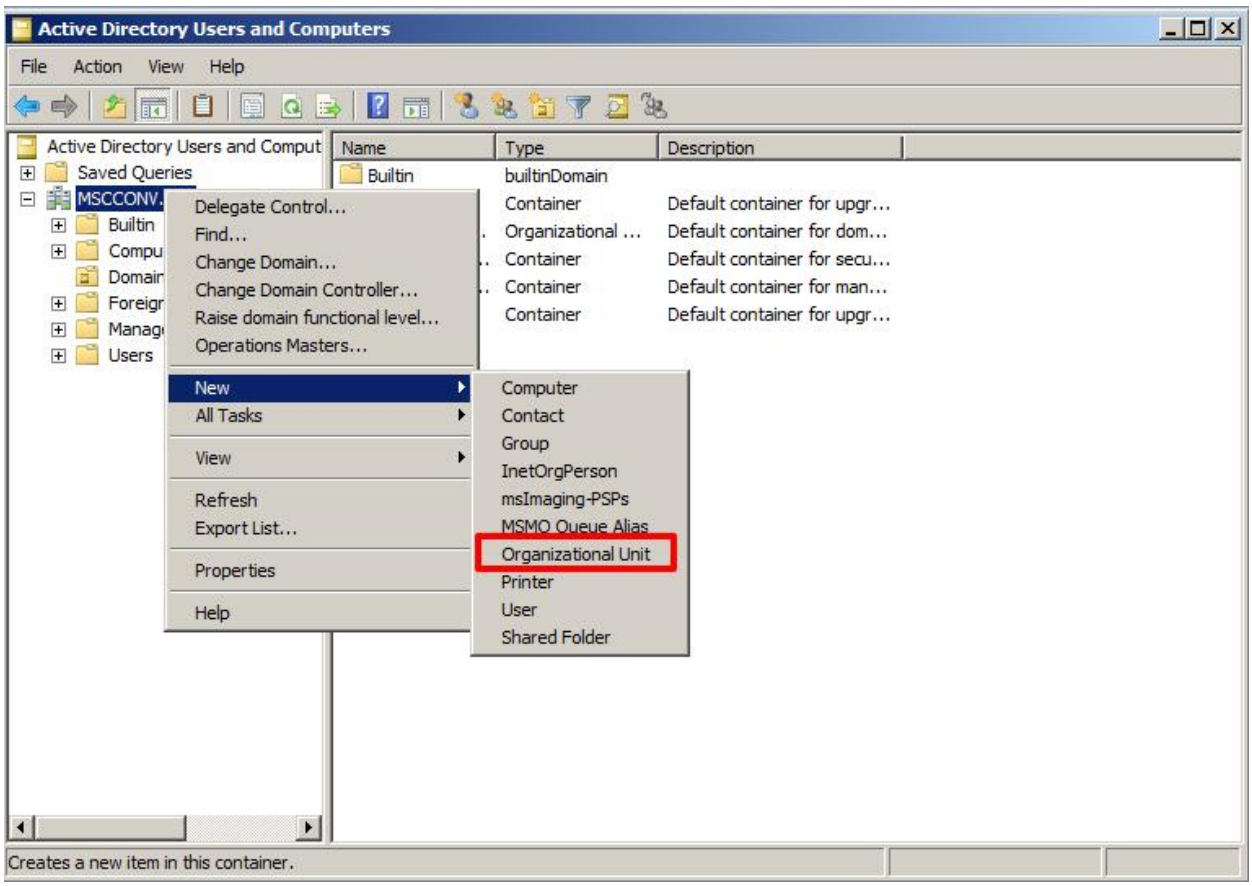
7.2 Procedure

7.2.1 Subtask 1 - Create Organisational Unit Structure

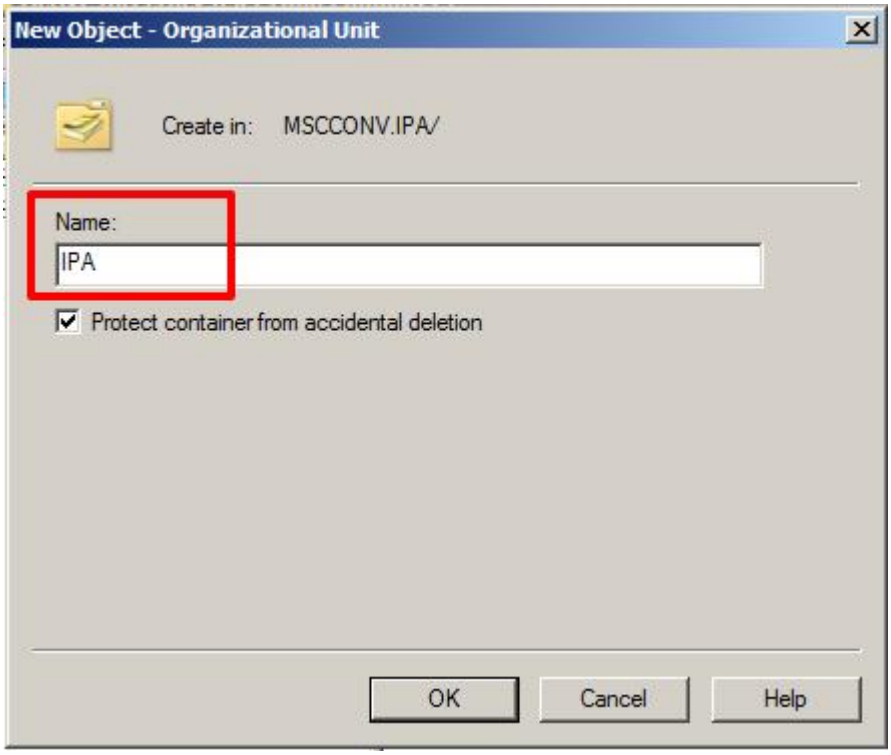
To create Organisational Units (OU), we click Start, Administrative Tools, Active Directory Users and Computers (AD UC).



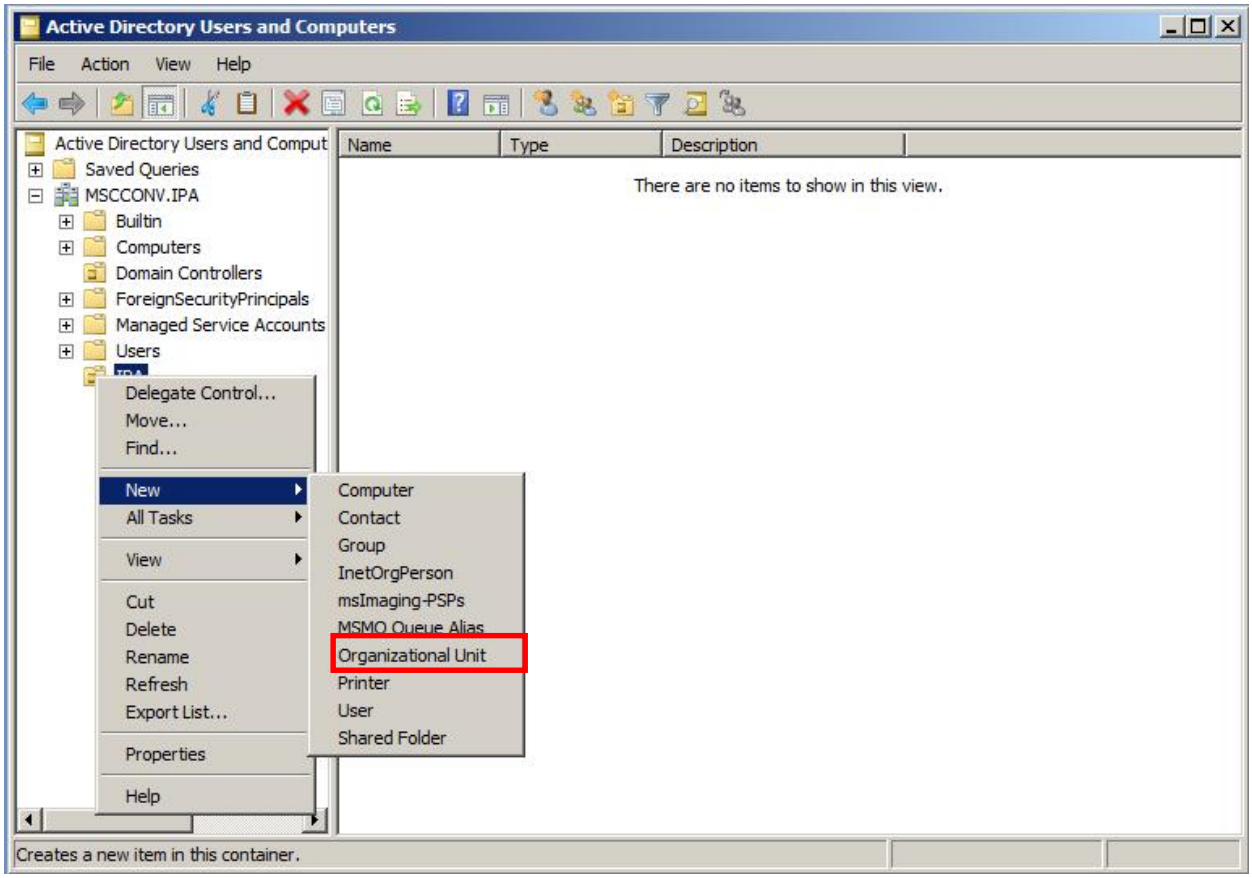
We then right click on our domain, select New, and click Organisational Unit.



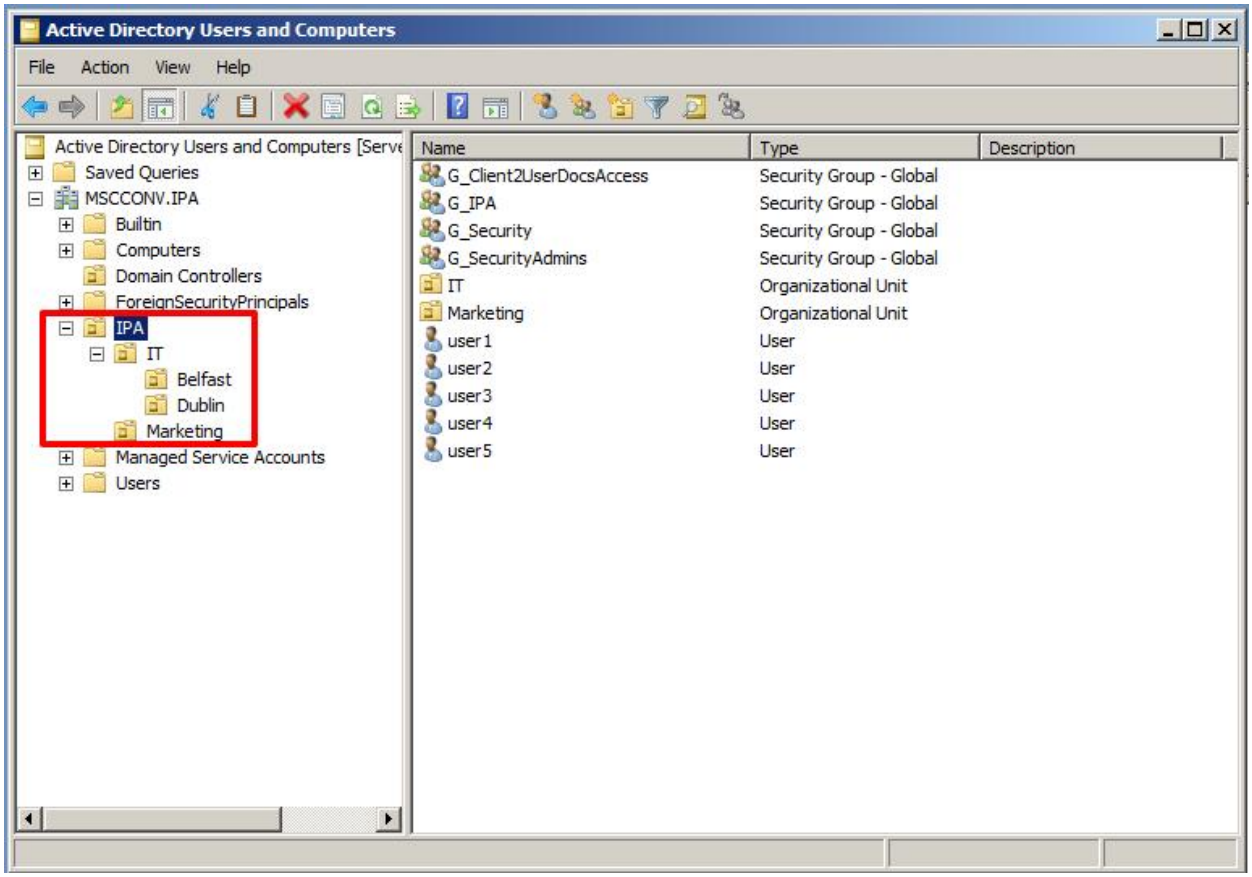
We then name the OU as required, in this case IPA. We also tick the Protect container from accidental deletion tickbox.



In order to create a nested OU within the IPA OU we simply right click on the IPA OU and select New, Organisational Unit, which can then be named appropriately.

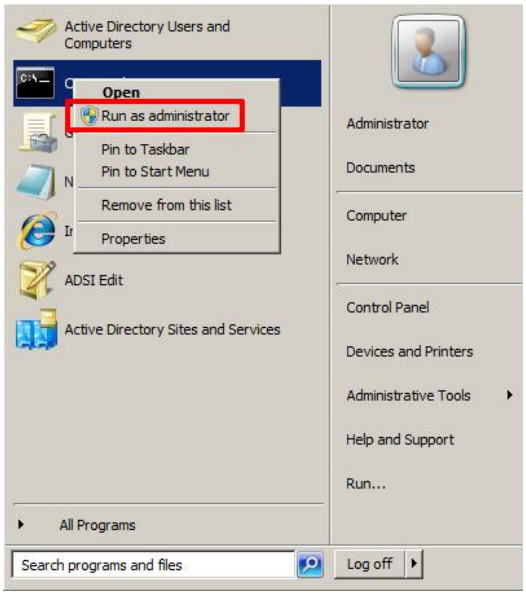


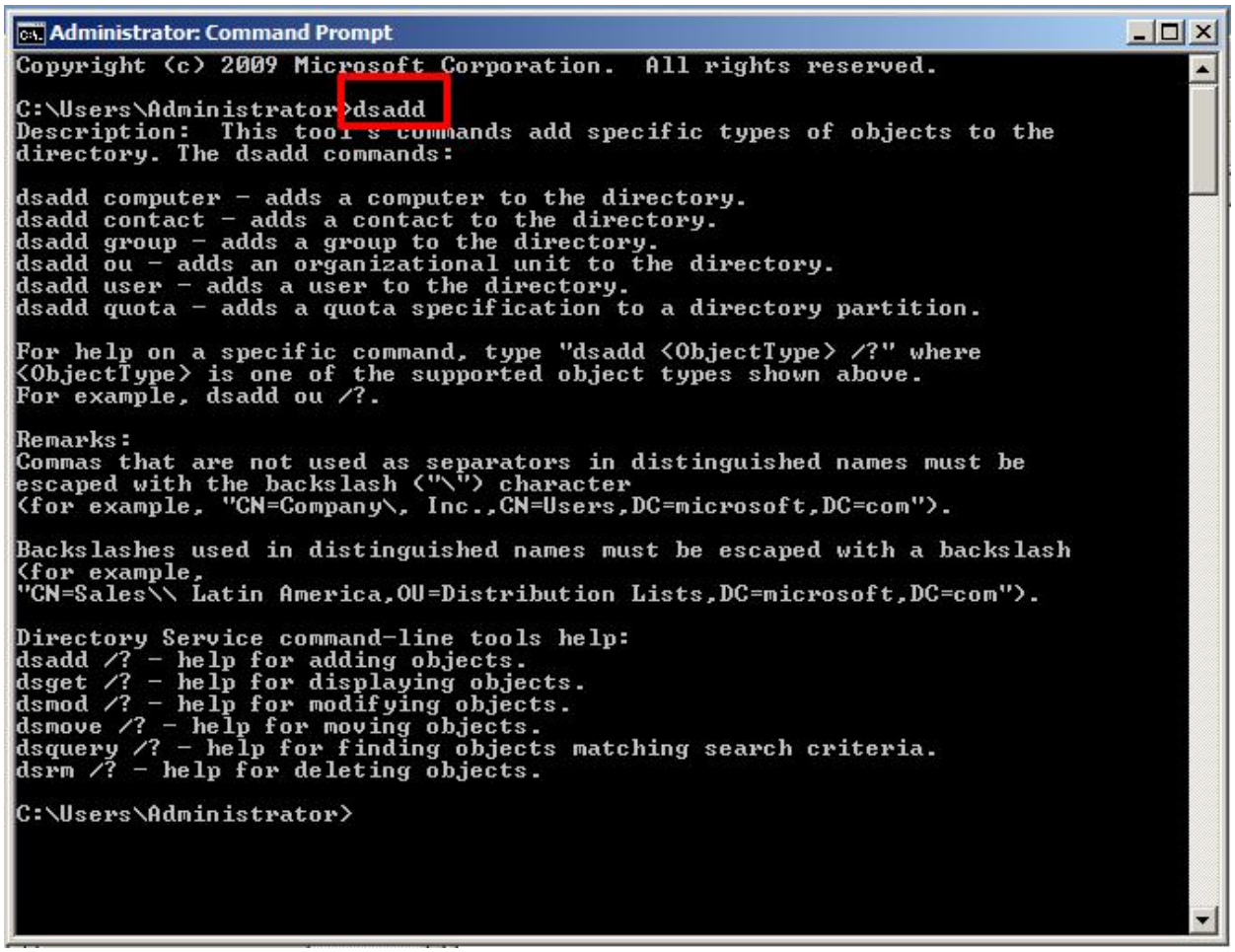
This process is repeated for the specified required OUs, leaving an Organisational Unit structure as shown below. Organisational Units are represented by a folder icon with a small book superimposed on it.



7.2.2 Subtask 2 - Creating Users using a TUI Environment

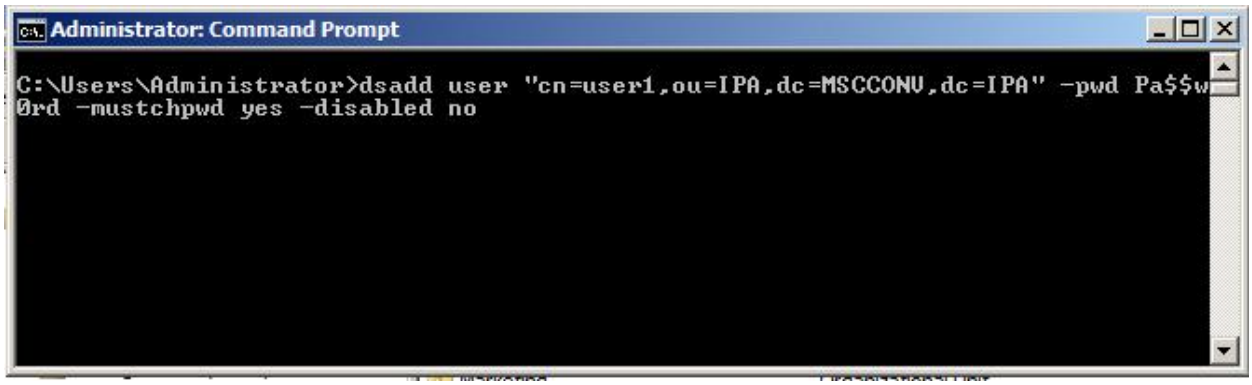
Within Active Directory, users can be created via a TUI environment by using the dsadd command-line tool that is built into Windows Server 2008. It is available when we have the Active Directory Domain Services (AD DS) server role installed. To use dsadd, we run the dsadd command from an elevated command prompt. To open an elevated command prompt, we click Start, right-click Command Prompt, and then click Run as administrator.




Administrator: Command Prompt
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Administrator>dsadd
Description: This tool's commands add specific types of objects to the directory. The dsadd commands:
dsadd computer - adds a computer to the directory.
dsadd contact - adds a contact to the directory.
dsadd group - adds a group to the directory.
dsadd ou - adds an organizational unit to the directory.
dsadd user - adds a user to the directory.
dsadd quota - adds a quota specification to a directory partition.
For help on a specific command, type "dsadd <ObjectType> /?" where <ObjectType> is one of the supported object types shown above.
For example, dsadd ou /?.
Remarks:
Commas that are not used as separators in distinguished names must be escaped with the backslash ("\") character
(for example, "CN=Company\, Inc.,CN=Users,DC=microsoft,DC=com").
Backslashes used in distinguished names must be escaped with a backslash
(for example,
"CN=Sales\\ Latin America,OU=Distribution Lists,DC=microsoft,DC=com").
Directory Service command-line tools help:
dsadd /? - help for adding objects.
dsget /? - help for displaying objects.
dsmod /? - help for modifying objects.
dsmove /? - help for moving objects.
dsquery /? - help for finding objects matching search criteria.
dsrm /? - help for deleting objects.
C:\Users\Administrator>

To create an enabled user account named user1 with a password of Pa$$w0rd that is not to change password at first logon, in our organizational unit (OU) named IPA in our domain named MSCCONV.IPA, we would type:

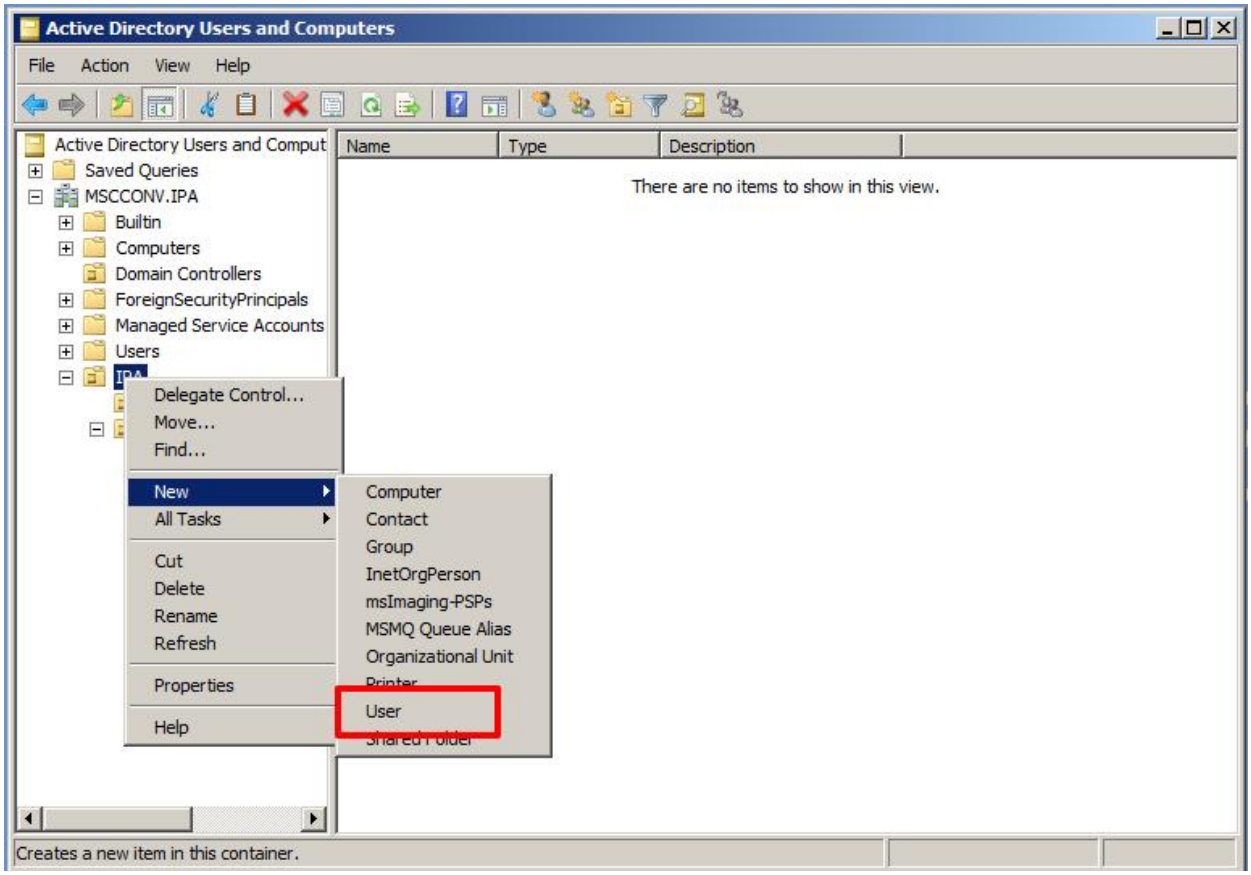
'dsadd user "cn=user1,ou=IPA,dc=MSCCONV,dc=IPA" -disabled no -p {Pa$$w0rd : *} -mustchpwd no'


Administrator: Command Prompt
C:\Users\Administrator>dsadd user "cn=user1,ou=IPA,dc=MSCCONV,dc=IPA" -pwd Pa$$w0rd -mustchpwd yes -disabled no

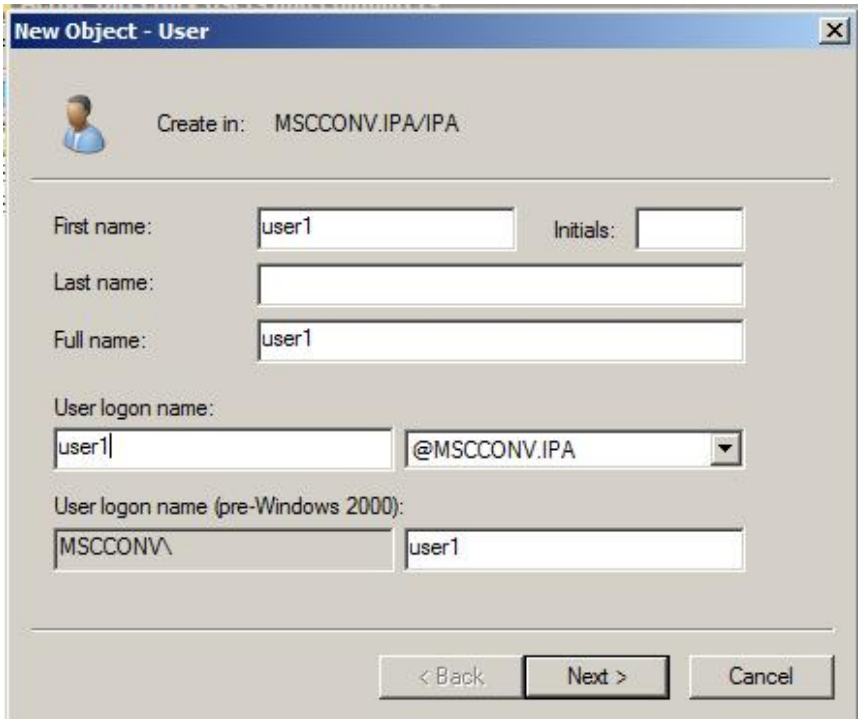
The main benefit of using a TUI environment to administer users is that it allows us to write one script to create/disable/delete accounts across multiple domains, thus saving time, and minimising scope for human error.

7.2.3 Subtask 3 - Create Users

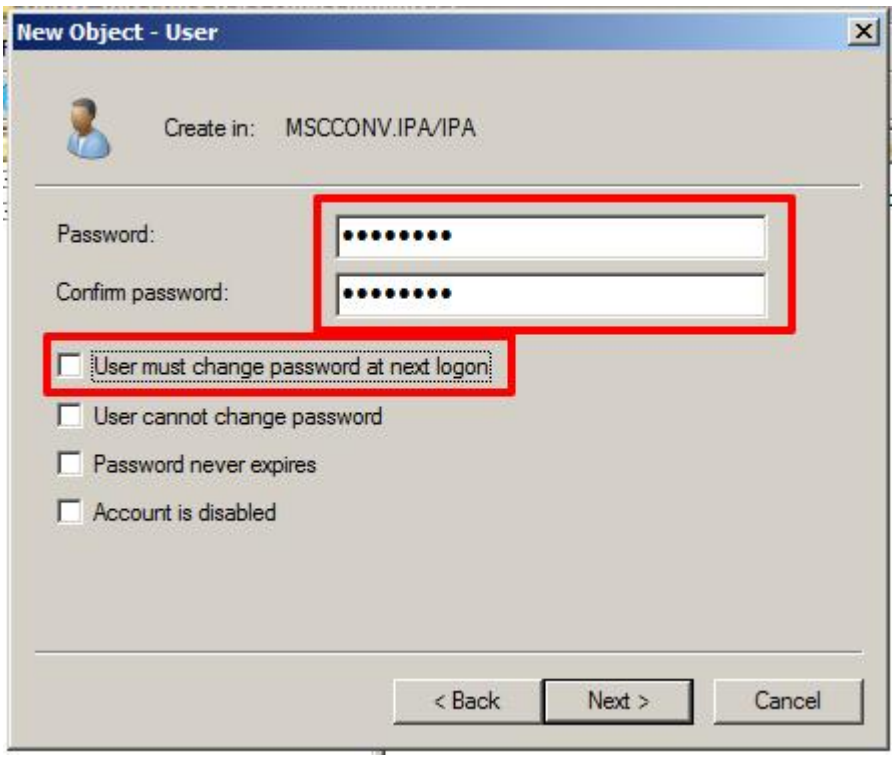
For the purposes of this manual we are using the GUI environment inherent in Active Directory to create our users. We right click on the OU in which we wish to create a user, click new and select User.



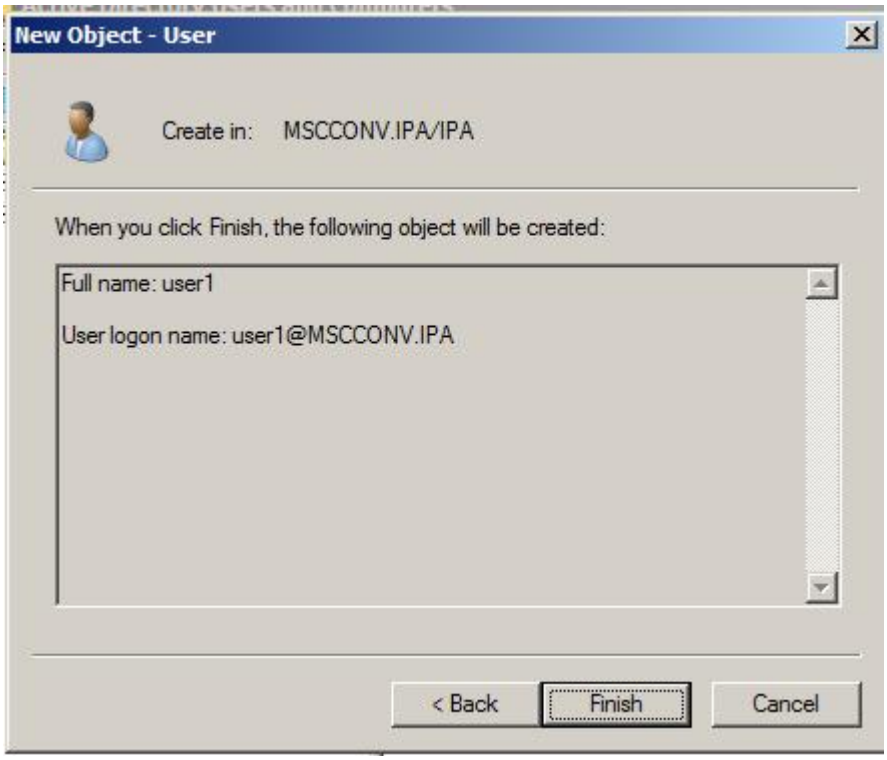
We then enter the details for the user.



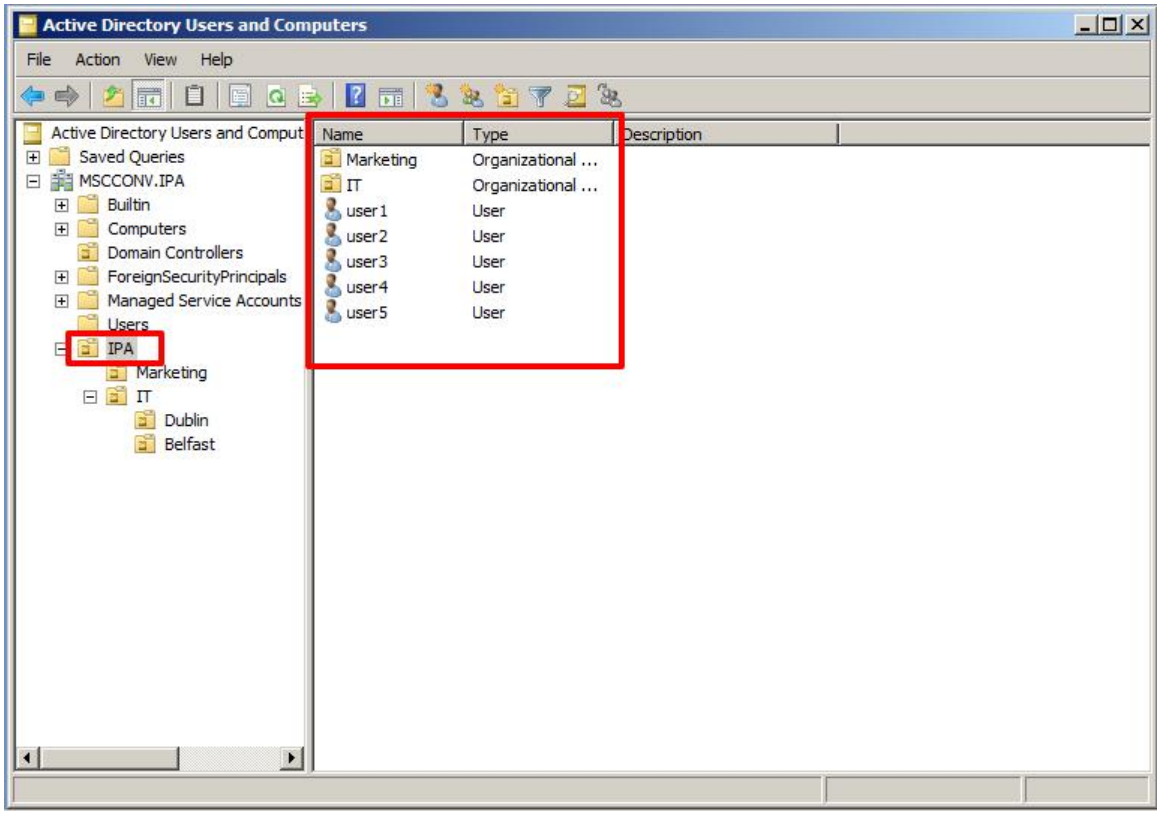
The next step is to enter the password Pa$$w0rd for the user as specified in the assignment brief. We also untick User must change password at next logon as per the assignment requirements.



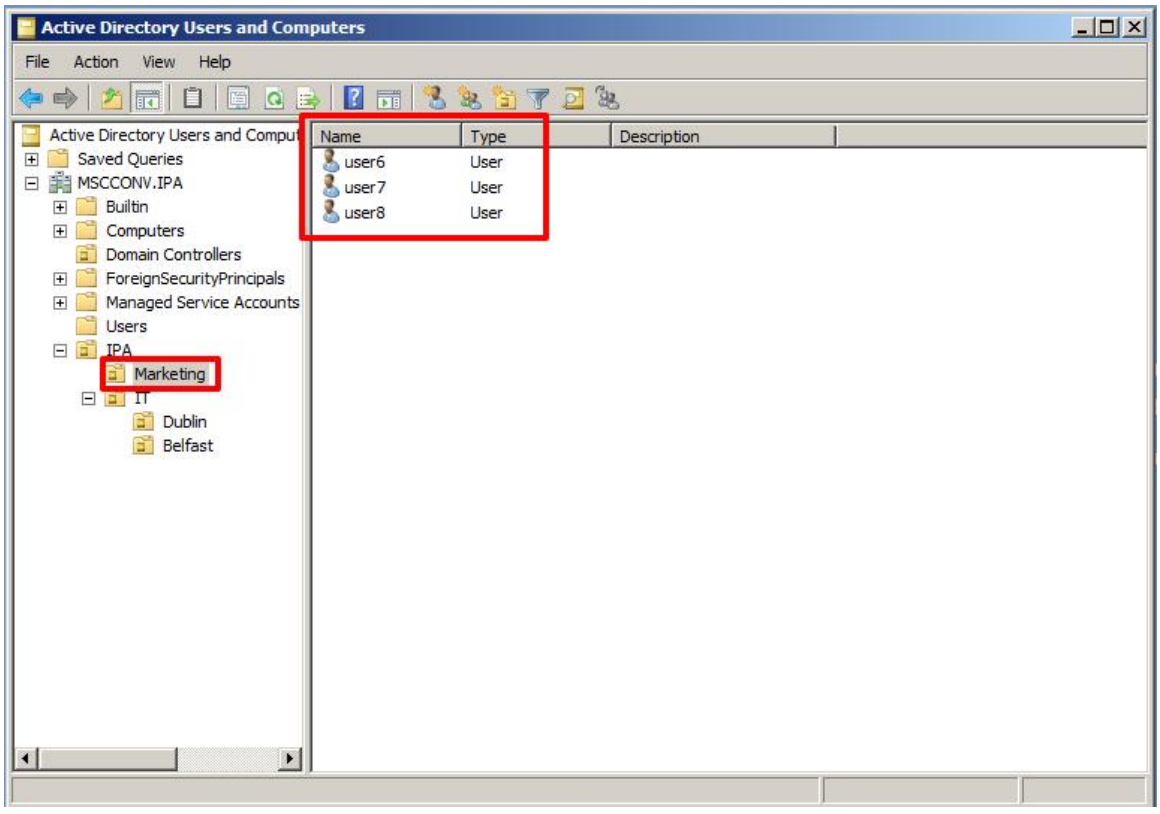
We then click Finish to create the User object.



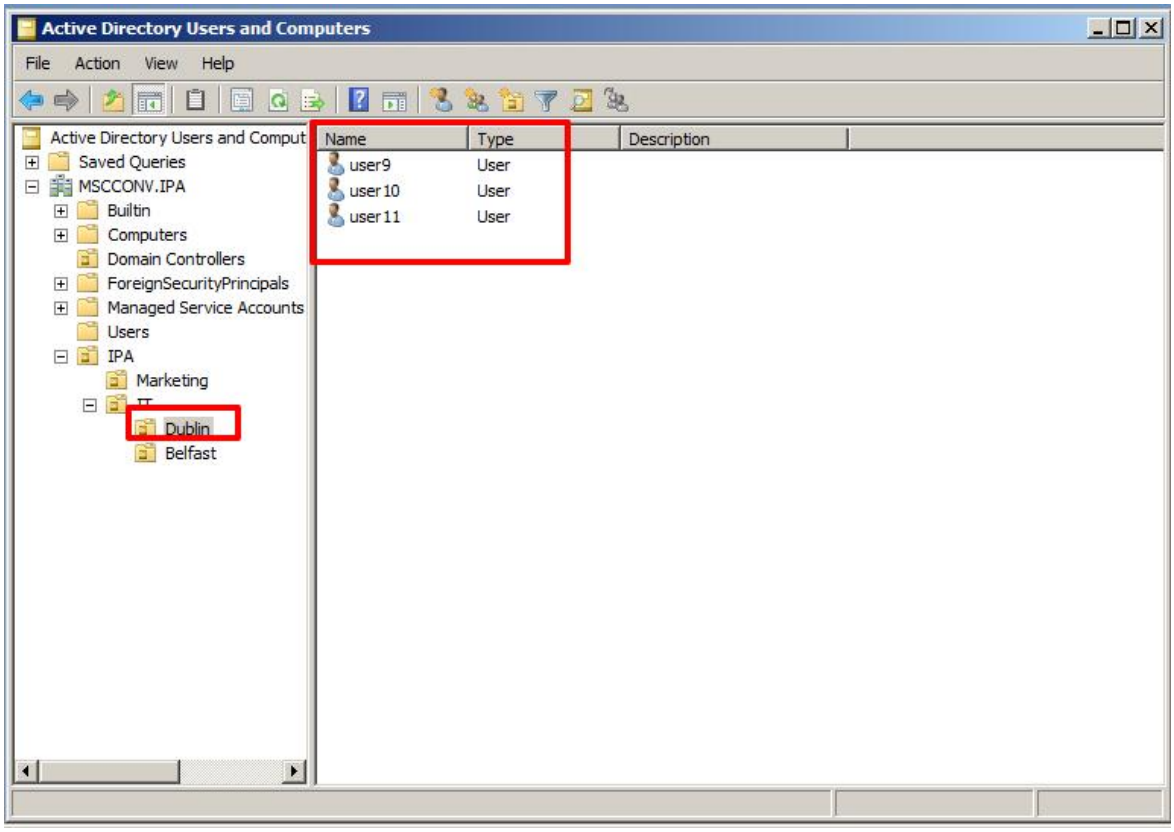
This process is repeated for all of the users specified in the brief. Please note that as the user numbers in the brief did not correlate with the number of users required to be created, user numbers were adjusted to match the number of users required. We can see below that five users were created in the IPA OU called user1 to user5.



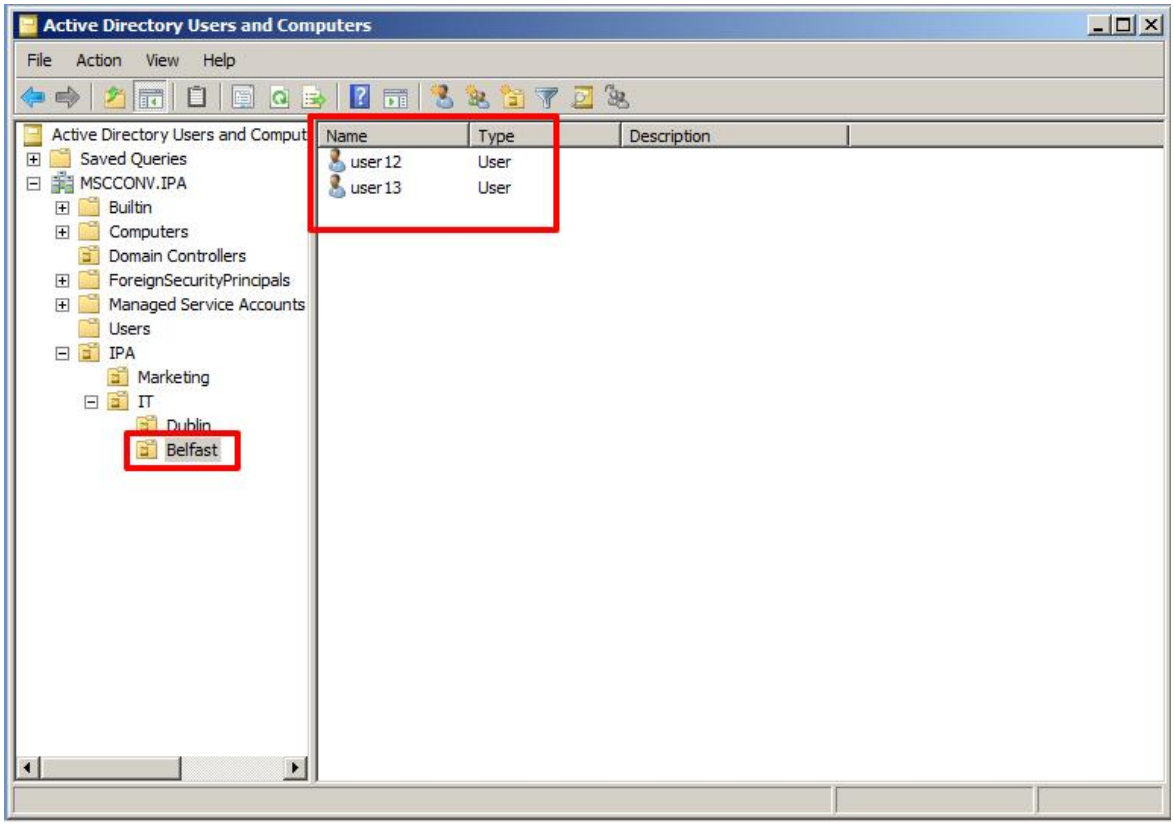
Three users were created in the Sales OU called user6 to user8.



Three users were created in the Dublin OU called user9 to user11.

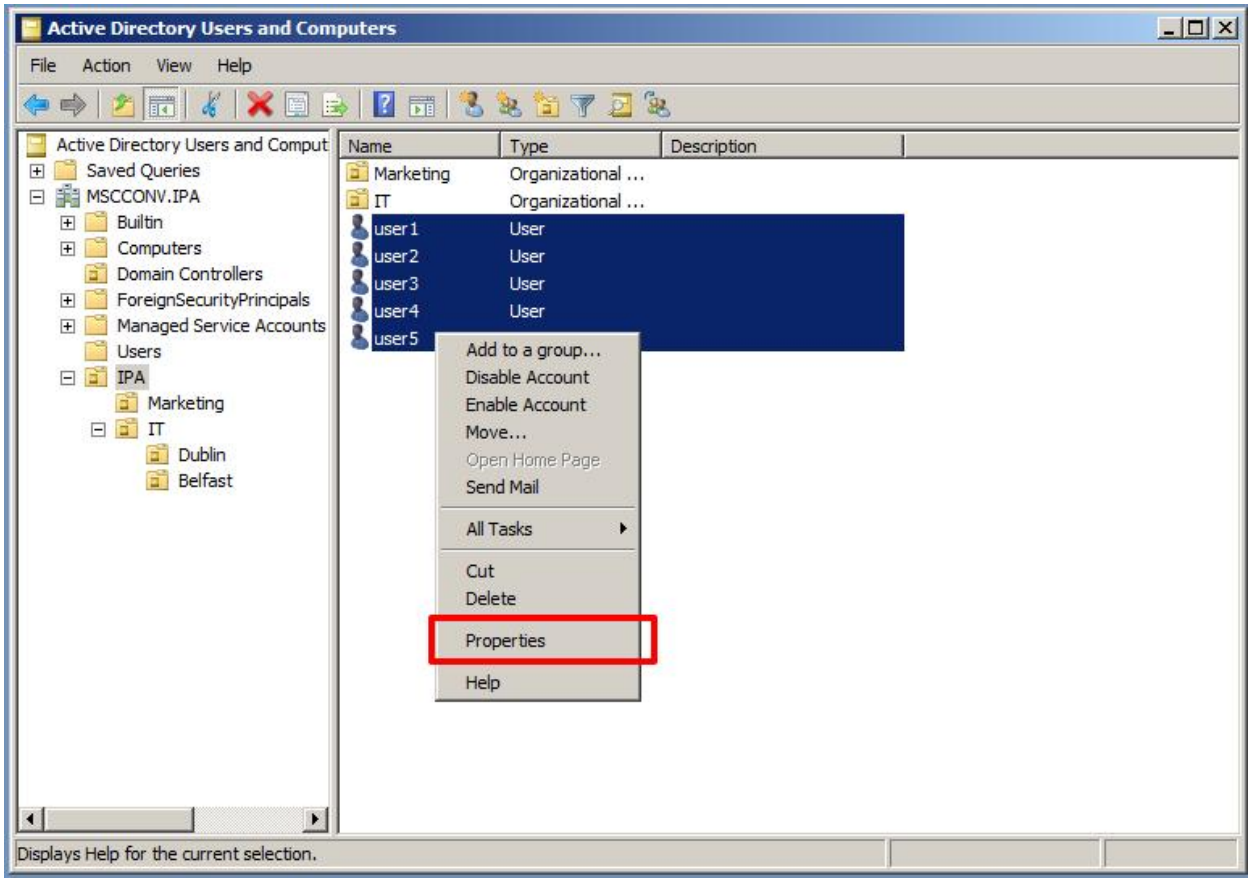


Finally, two users were created in the Belfast OU called user12 and user13.

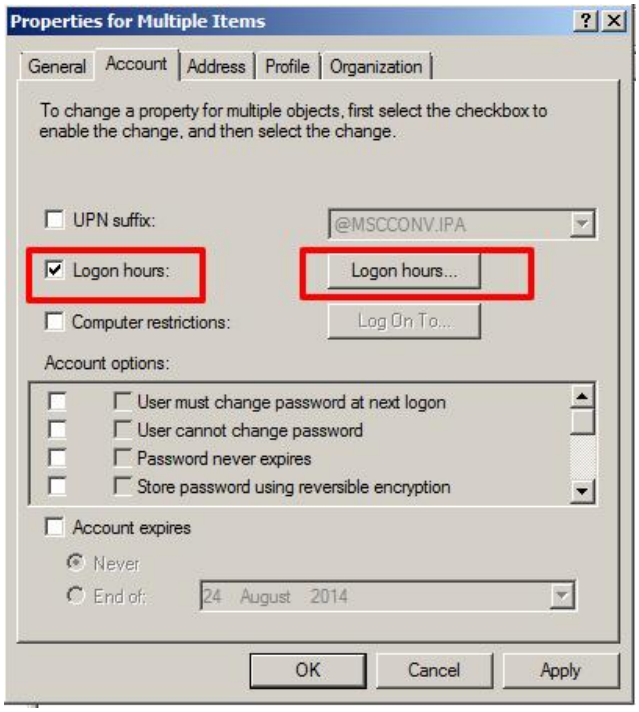


7.2.3 Subtask 3 - Set Logon Hours for Users

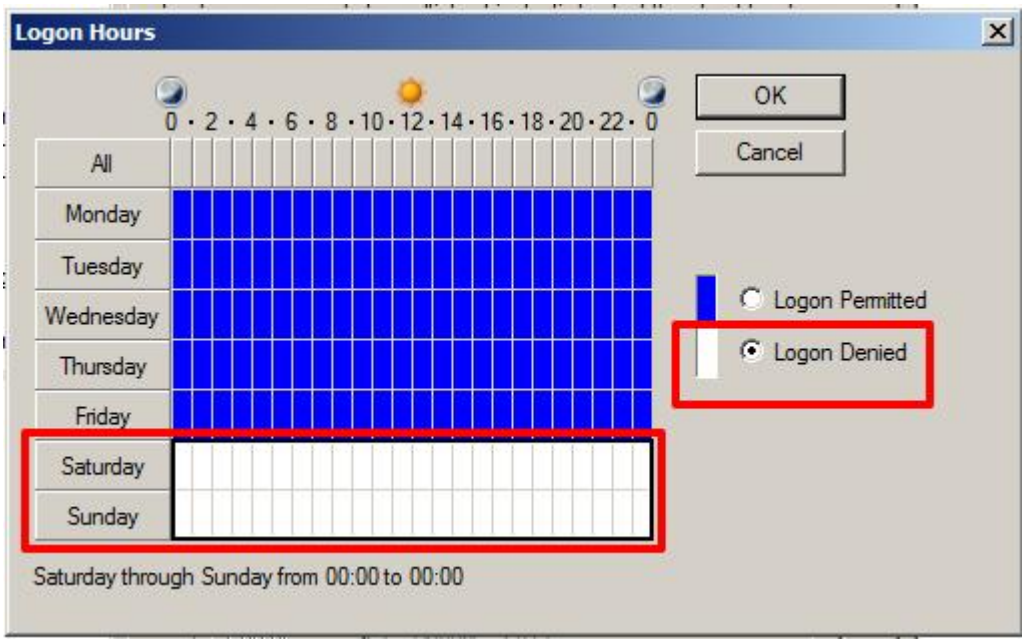
To restrict user access to the network to 24 hours per day, Monday to Friday we will modify the logon hours for users. From AD UC we highlight the users to whom we will be applying the restriction, right click and select Properties.



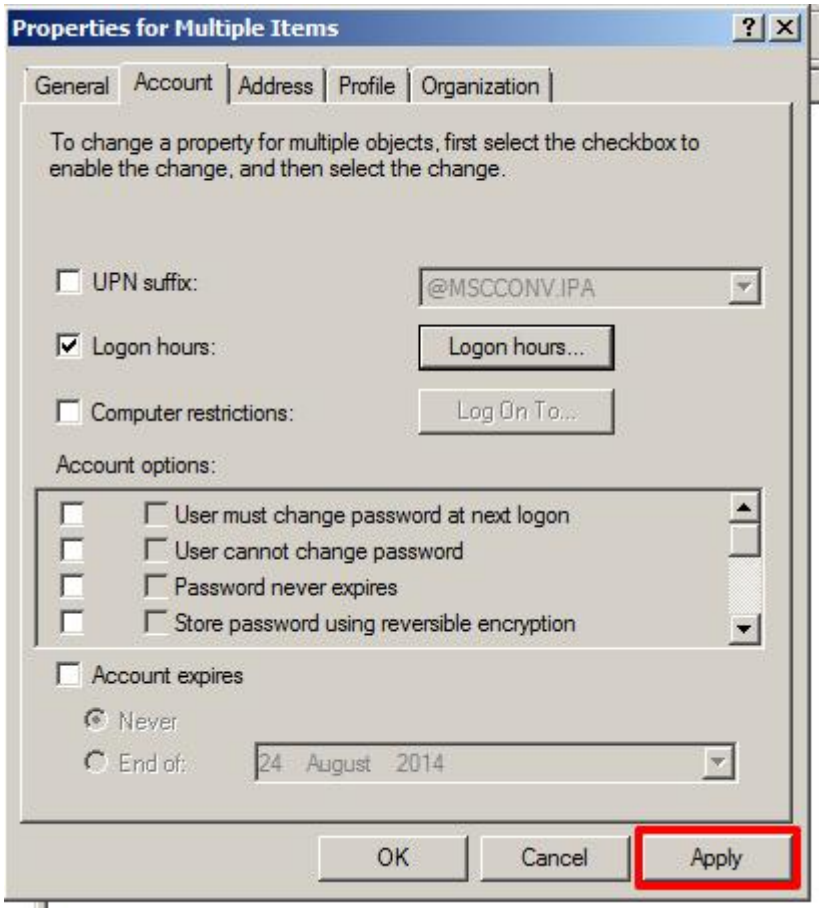
In the Properties dialog box, we open the Account tab, we tick Logon hours and click Logon hours.



By default users are permitted 24 hour access 7 days a week, indicated in blue. Therefore we select the blue sections for Saturday and Sunday and then click Logon Denied, changing the hours for these two days to white, indicating Logon Denied, and then click OK.



We are then returned to the Properties window where we click Apply.



The above procedure is repeated for all users.

8. Part B - Task E

- *Group the users in each OU according to recommended security policies.*
- *Prevent the users in the sales OU from being able to see the IT OU in Active Directory.*
- *Create 3 group policies to achieve the following:*
- *Forward my documents from Client2 to a folder on the root of C on Server2 called User_Docs.*
- *Prevent Belfast from accessing control panel. Please exclude user 20 from this policy.*
- *Publish any MSI file of your choice from the C drive contents to all users in Dublin.*

8.1 Preamble

Organisational Units such as those created in the preceding task are used in Active Directory for the delegation of administrative authority over users. However, OU's are not security principals, and therefore they do not preclude the need for groups, as groups are used for controlling permissions of access to resources on a network. The difference between OUs and groups has been simply described[19] as "You put a user in a group to control that user's access to resources. You put a user in an OU to control who has administrative authority over that user."

Hereunder we will describe the procedure for creating groups that reflect the organisation's hierarchical OU structure, and also that reflect recommended best security practices in an enterprise environment.

Group Policy Objects (GPO) have been defined [20] as containers for groups of settings (policy settings) that can be applied to user and computer accounts throughout an ActiveDirectory network. They allow a setting to be configured once and then applied to many users and/or computer objects. GPOs can be applied, or linked as it is termed in Active Directory to OUs or entire domains as required. It is possible for an OU or other Active Directory object to have multiple GPOs linked to them. As will be shown below, GPOs are configured and managed through the Group Policy Management snap-in and the Group Policy Management Editor.

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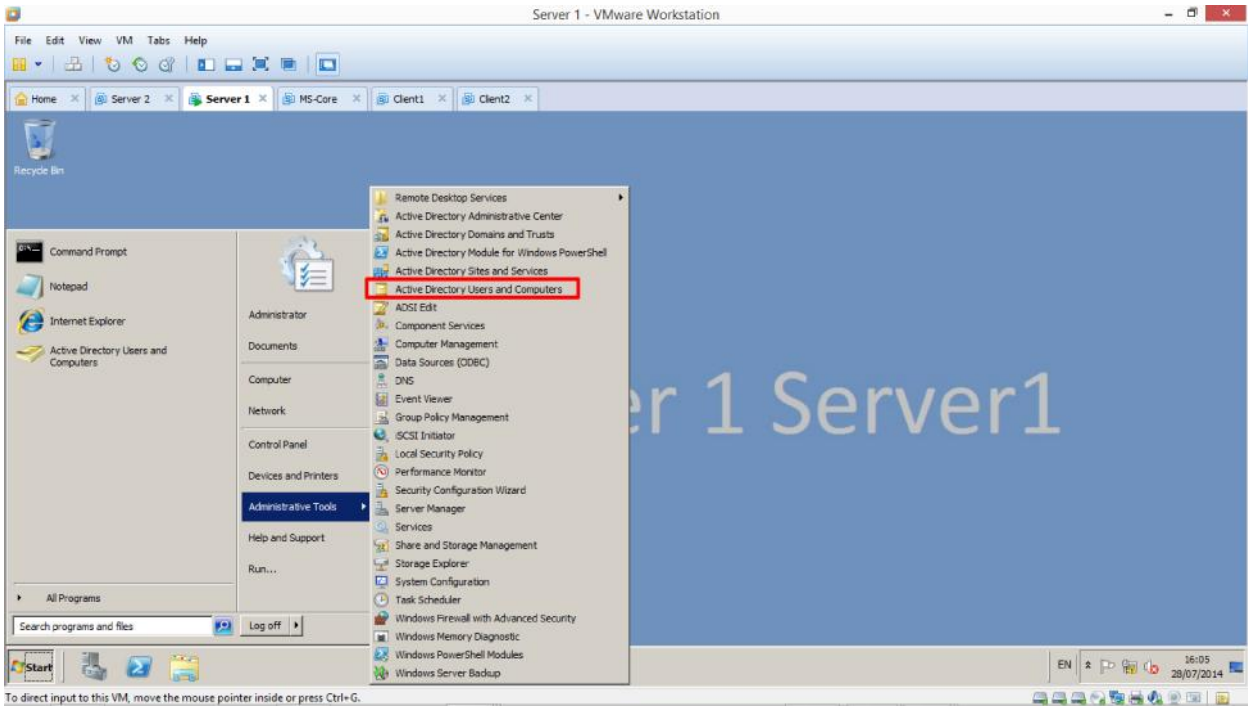
[19] http://windowsitpro.com/security/access-denied-understand-difference-between-ad-ous-and-groups. Accessed July 20, 2014.
[20] T.Brett, Group Policy, July 1 , 2014.

8.2 Procedure

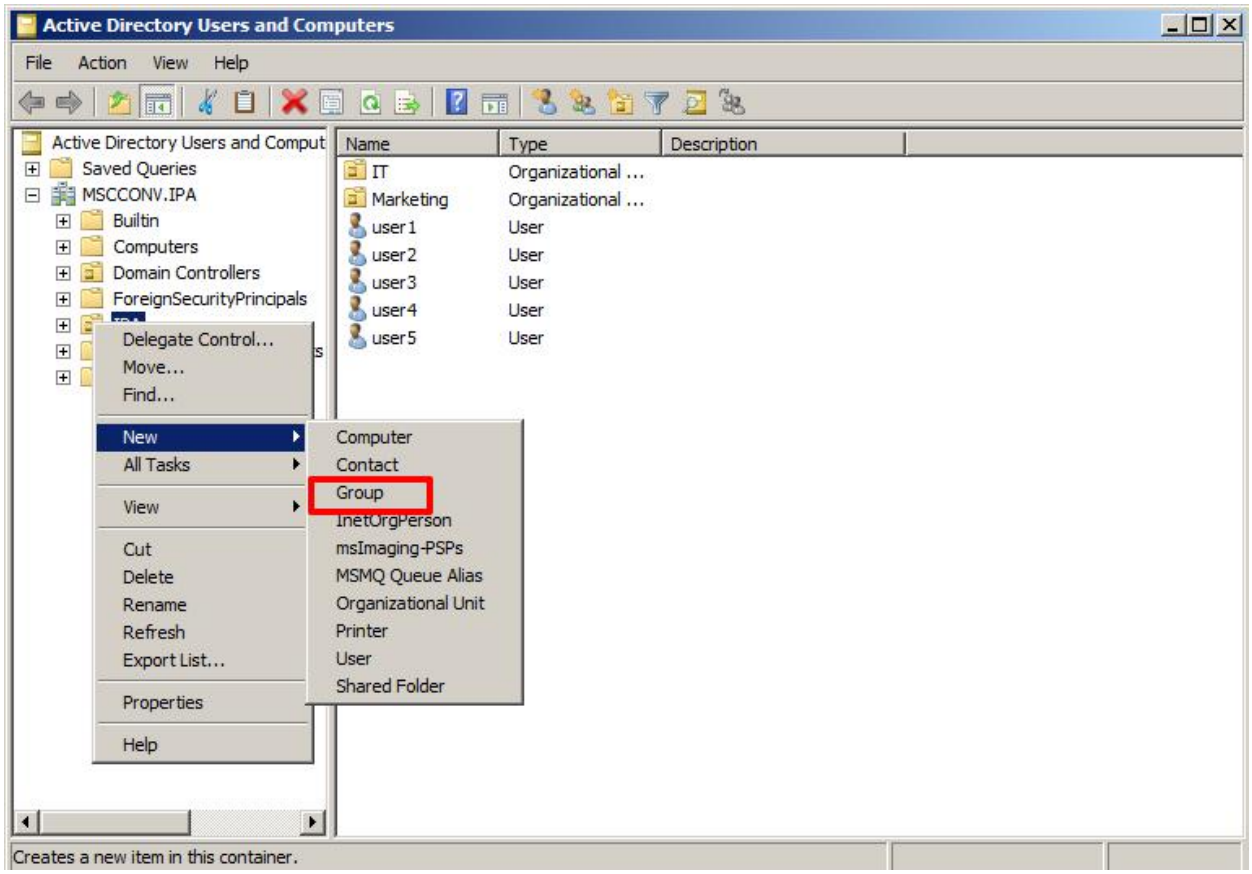
8.2.1 Subtask 1 - Group Users in each OU

8.2.1.1 Step 1 - Create Groups

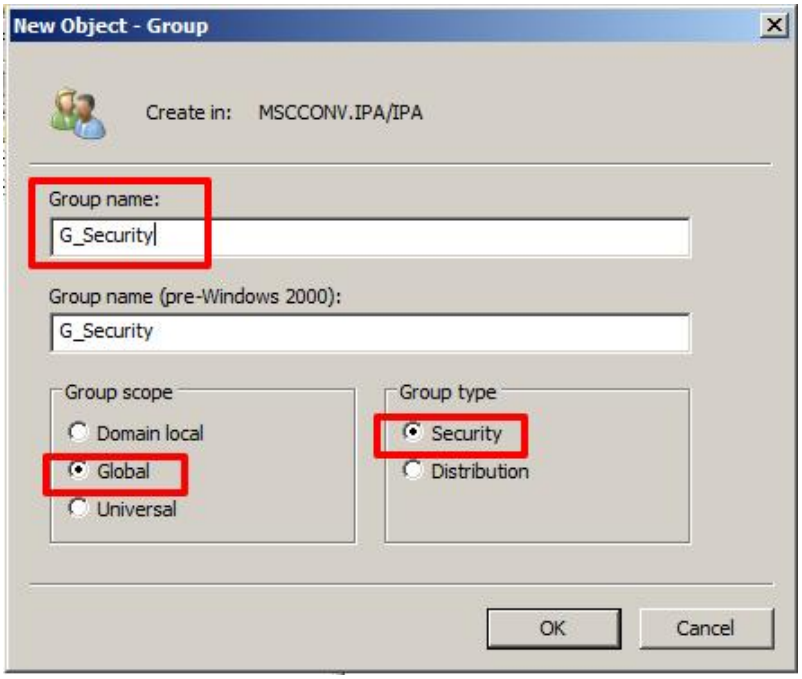
To create a group we open Start, Administrative Tasks, Active Directory Users and Computers (AD UC).


Server 1 - VMware Workstation
Active Directory Users and Computers
Administrative Tools
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

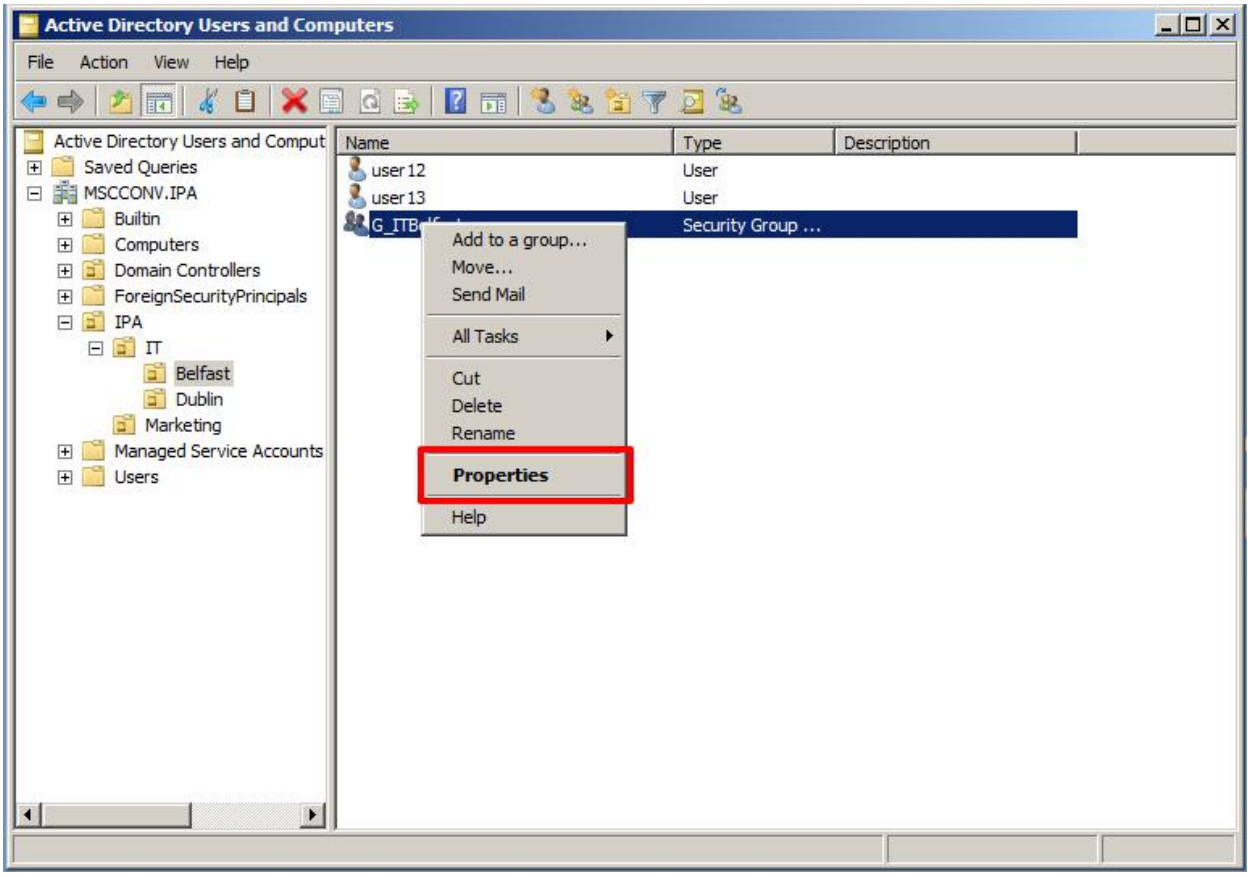
We then right click on the OU within which we wish to create a group, and select new, Group.



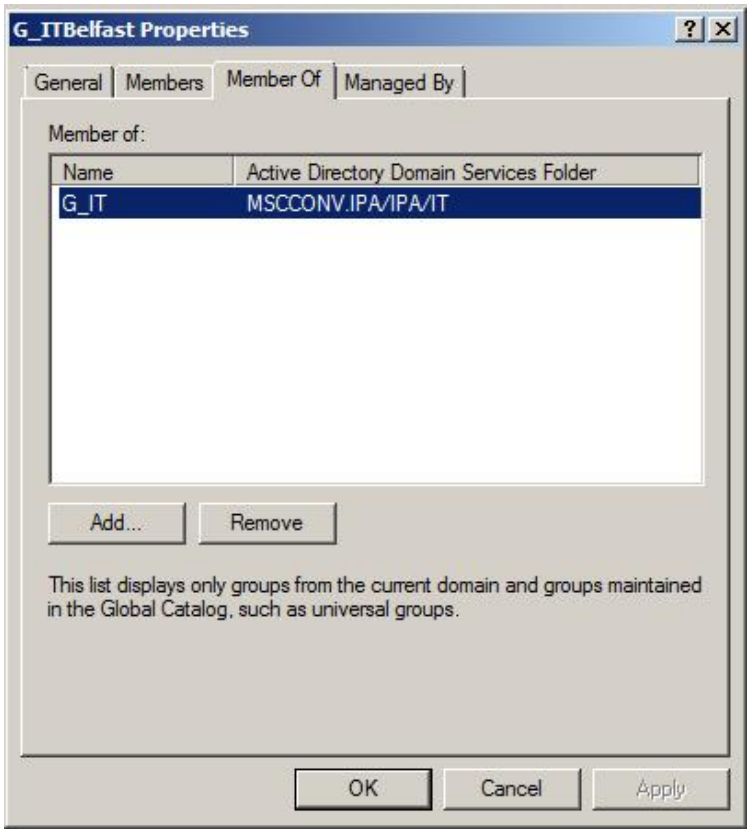
We can then name the group, and select it's scope as global, and the group type as Security. Shown below is the G_Security group, members of which will be all users. This group will be used to apply a general fine-grained password policy described later hereunder.



As we are creating a group structure to mimic our OU structure it is important to ensure that any sub-groups that we create should be set as members of the group above them in the organisation hierarchy. This is achieved by right clicking on the group when it is created and selecting Properties.

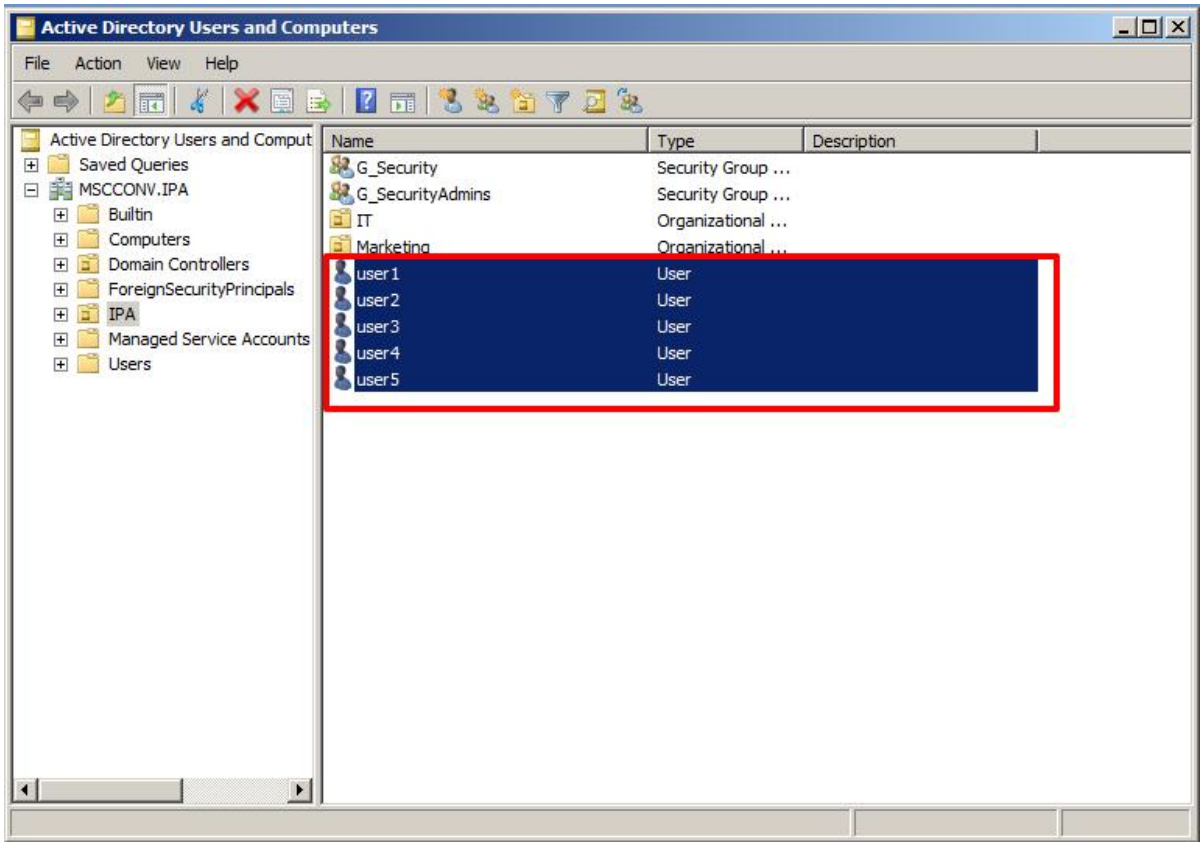


In the Member Of tab, we can then add the group of which the current group is required to be a member. Below we see that we have made the G_ITBelfast group a member of the G_IT group.

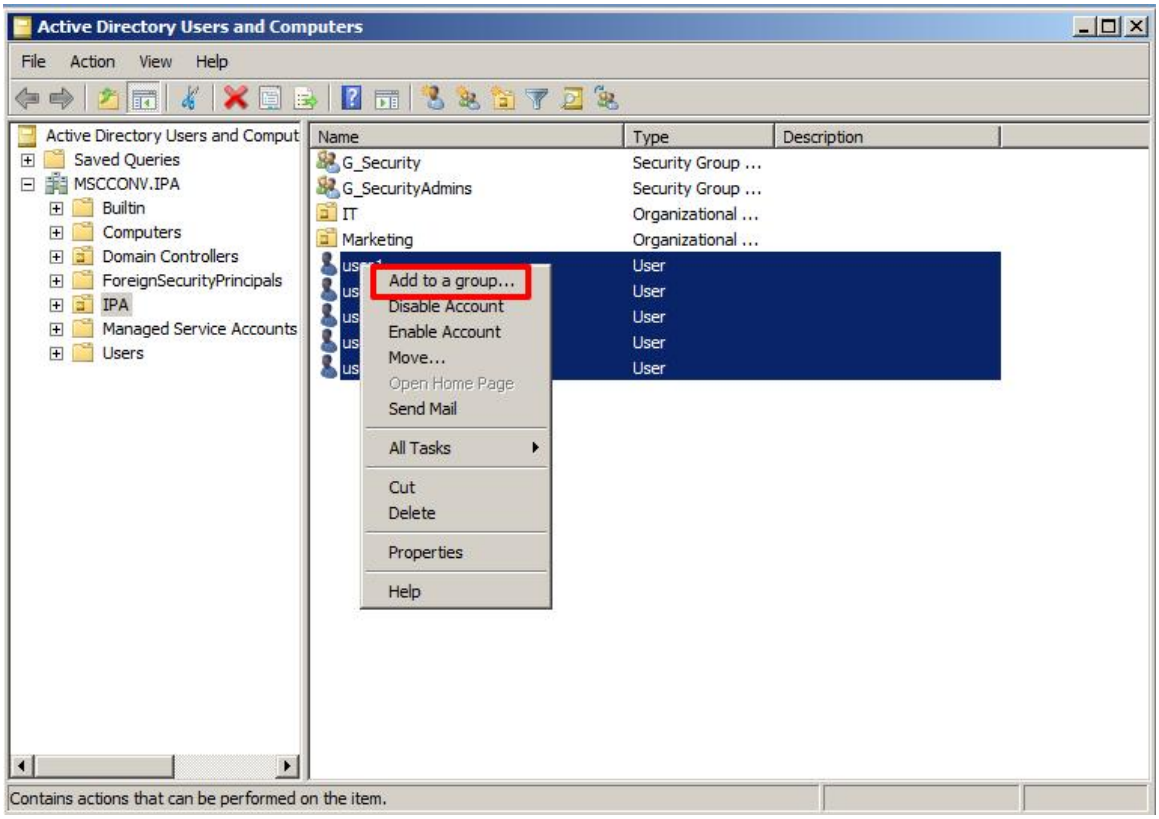


8.2.1.2 Step 2 - Add Users to Groups

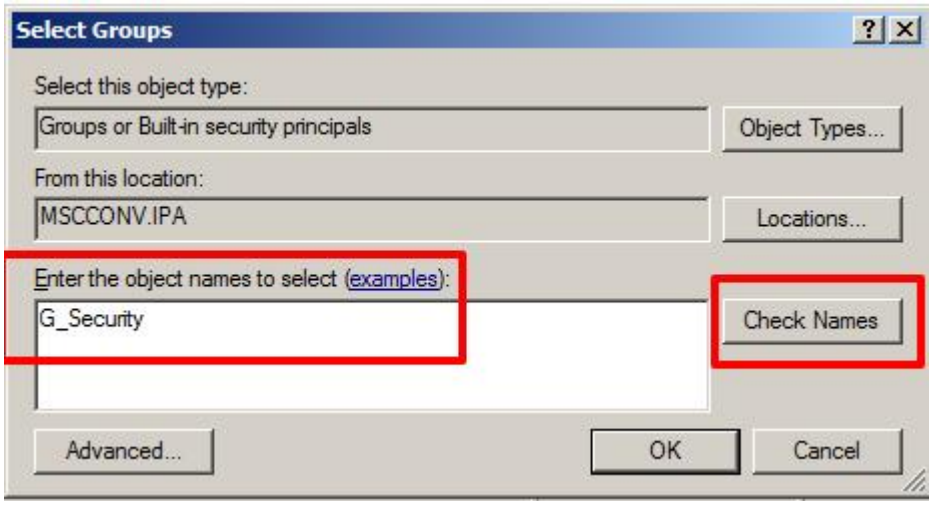
To add users to a group, in ADUC we highlight the users we wish to make members of a group.



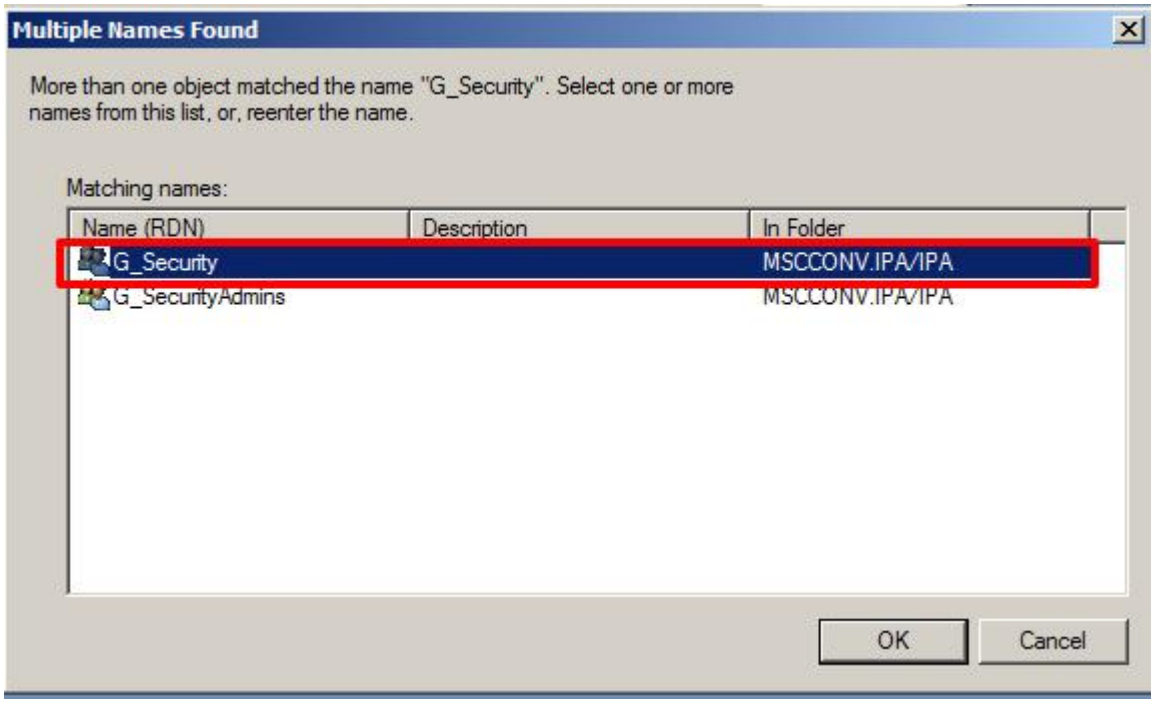
We then right click on the highlighted users and click Add to a group.



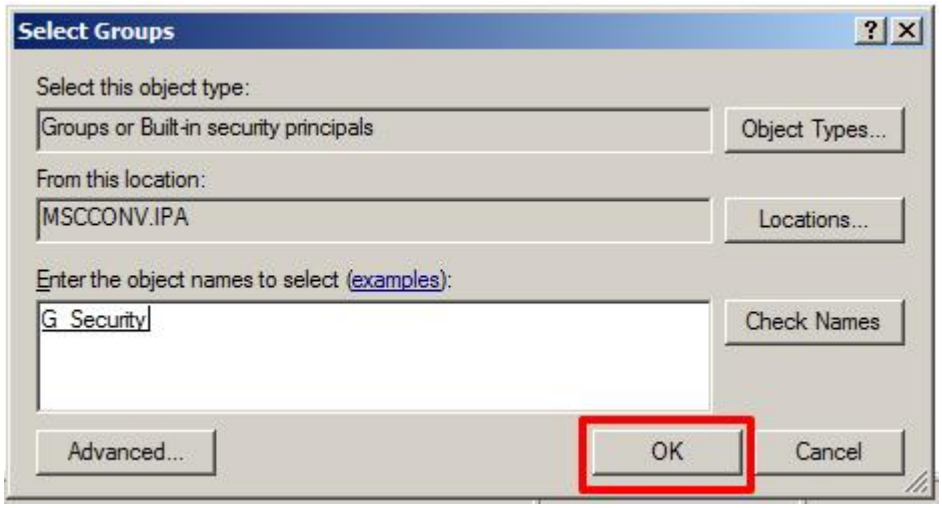
We can then enter the name of the group we wish to add the users to, in this case the G_Security group, and click Check Names to retrieve the correct group from the Active Directory.



We then select the correct group from the retrieved groups.



The correct group has been selected, and we click OK.



A message is generated confirming the operation was successful.

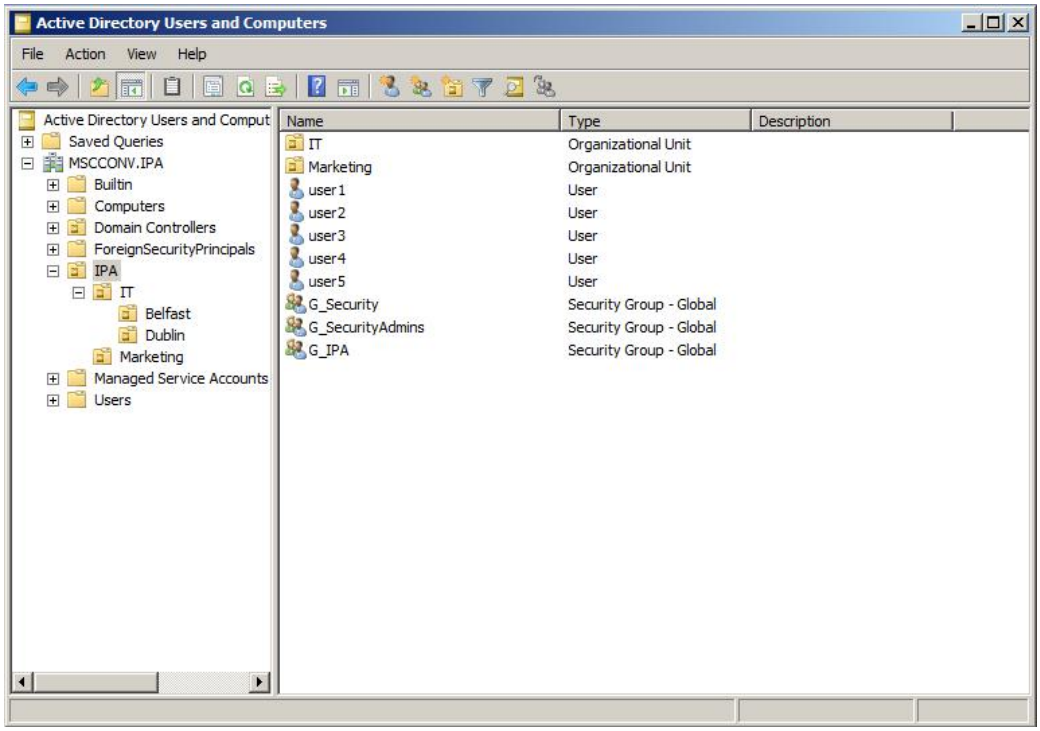
8.2.1.3 Step 3 - Summary of Groups

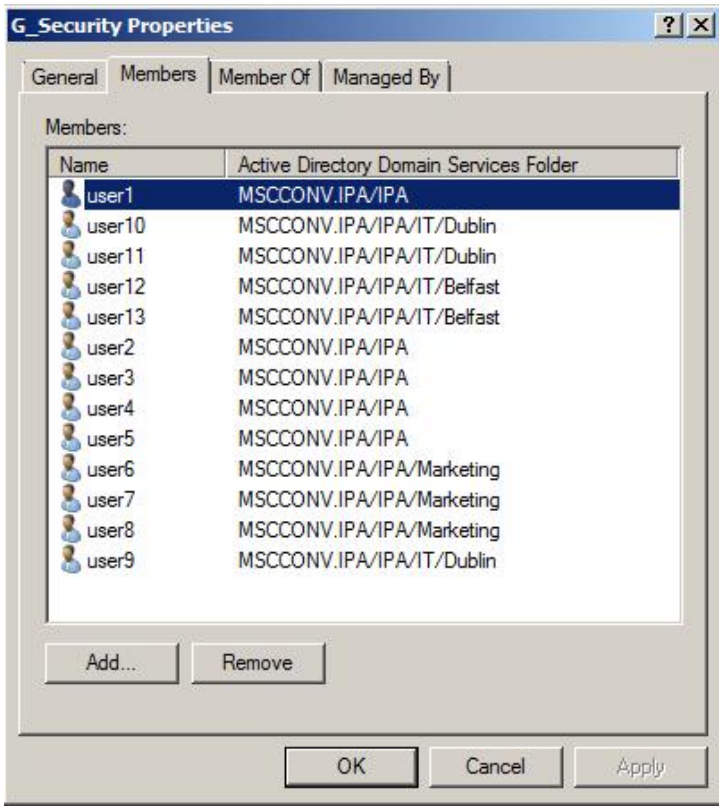
We see below that we have created three groups in the IPA OU;

G_Security: Contains all users for the purposes of applying a fine-grained password policy

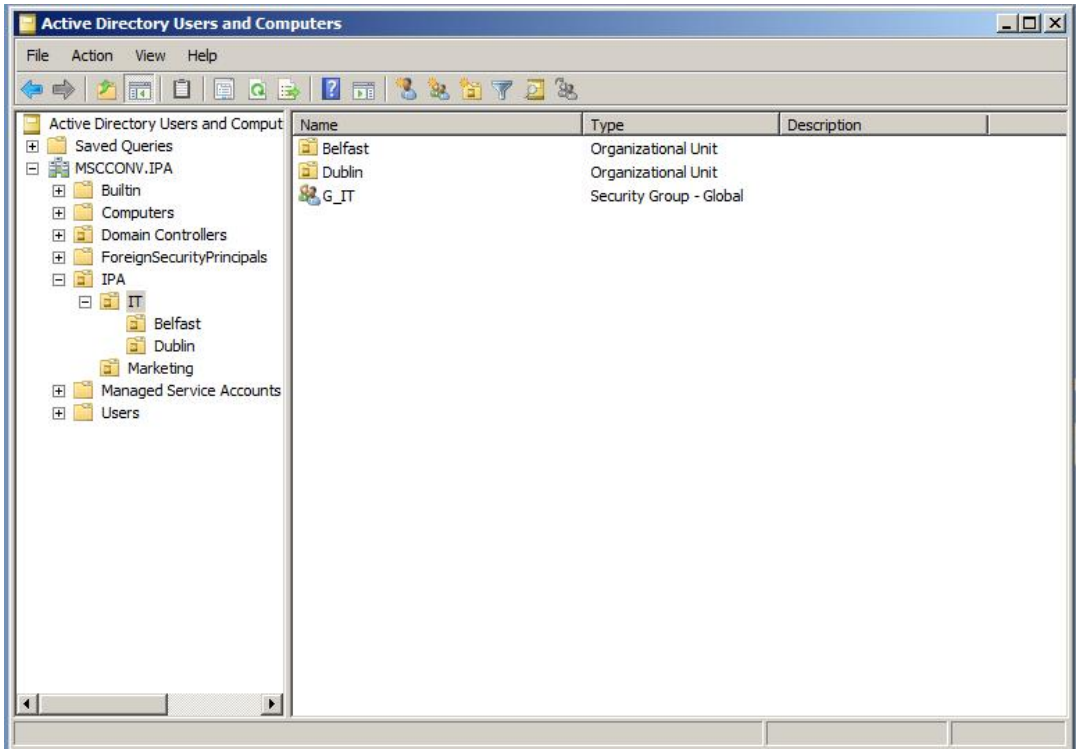
G_SecurityAdmins: Contains the Admins for the domain who will have a stricter password policy applied to them

G_IPA: Contains the users who reside in the IPA OU.

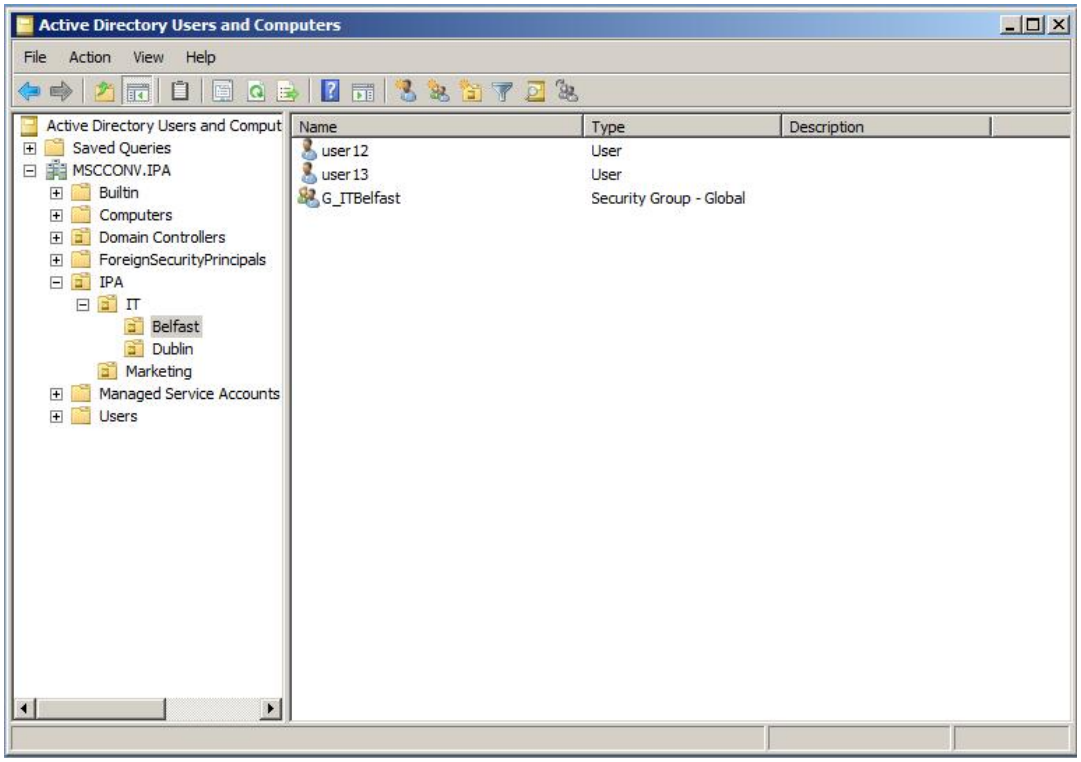




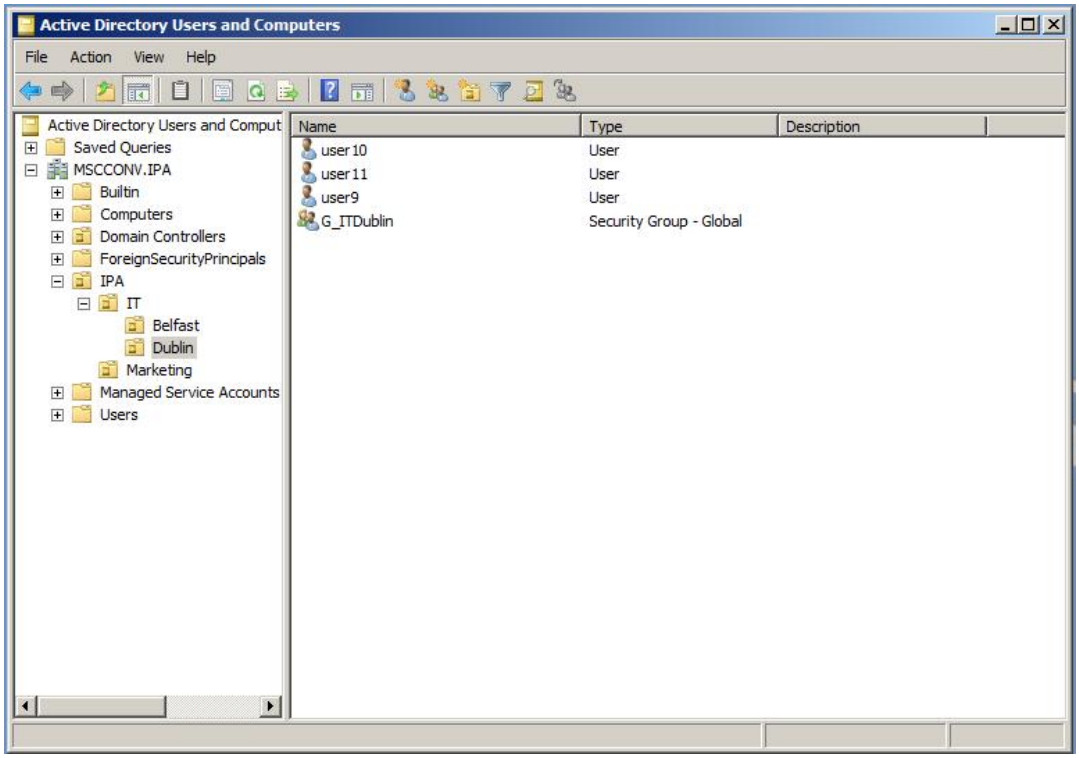
The IT OU contains the G_IT group.



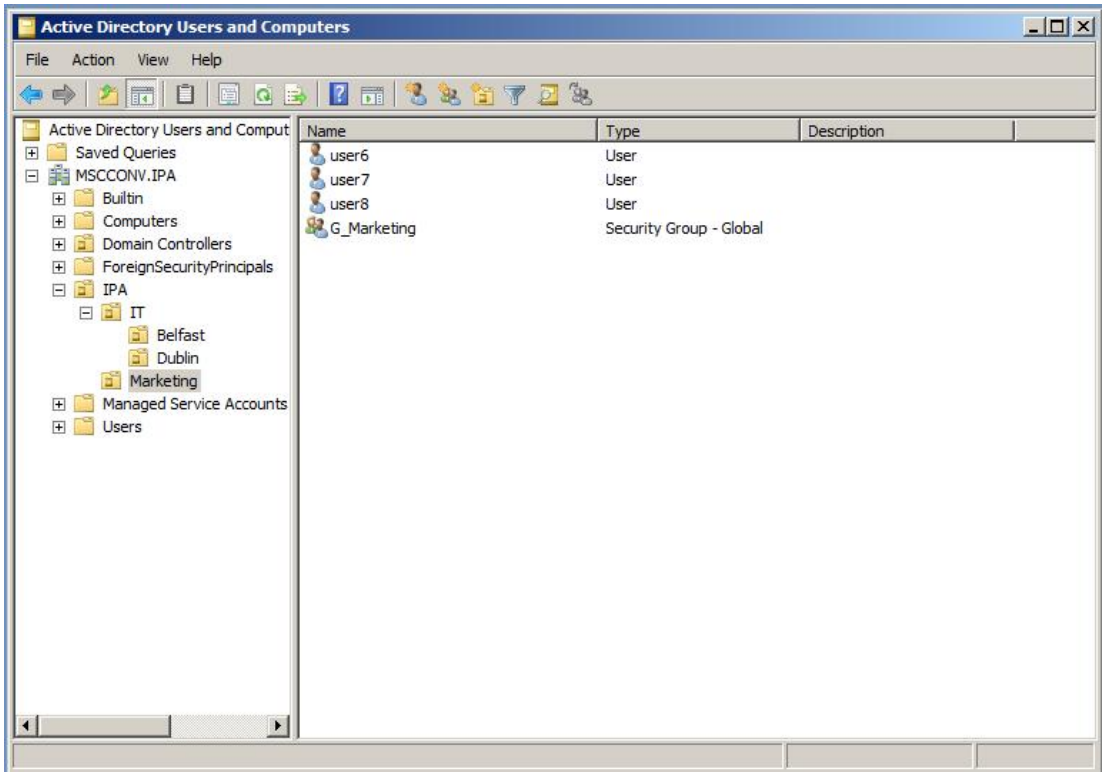
The Belfast OU contains the G_ITBelfast group, members of which are user12 and user13.



The Dublin OU contains the G_ITDublin group, members of which are user9 to user11, who reside in the Dublin OU.

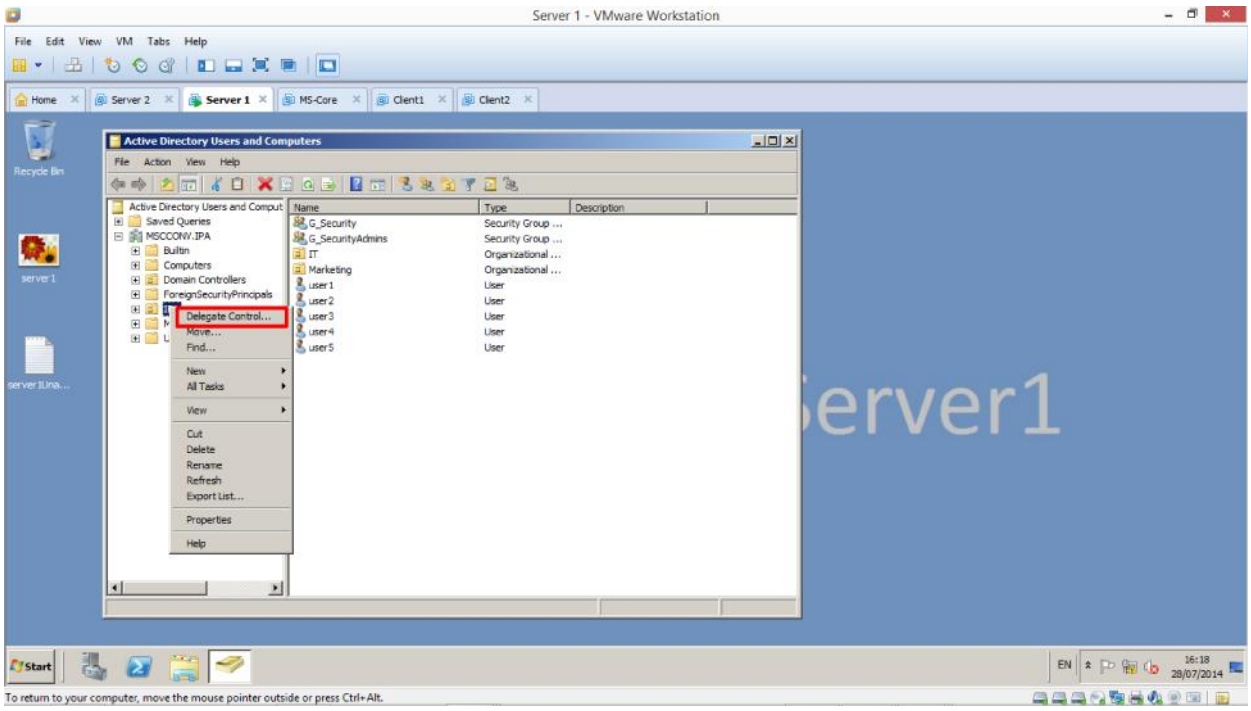


The Marketing OU contains the G_Marketing group, which contains user6 to user8, who reside in the Marketing OU.



8.2.1.4 Step 4 - Delegate Control of OUs to Security Admin Group

As recommended by microsoft [21] , we will delegate control of our overall OU, and this is done from AD UC, by right clicking on the IPA OU and selecting Delegate Control.

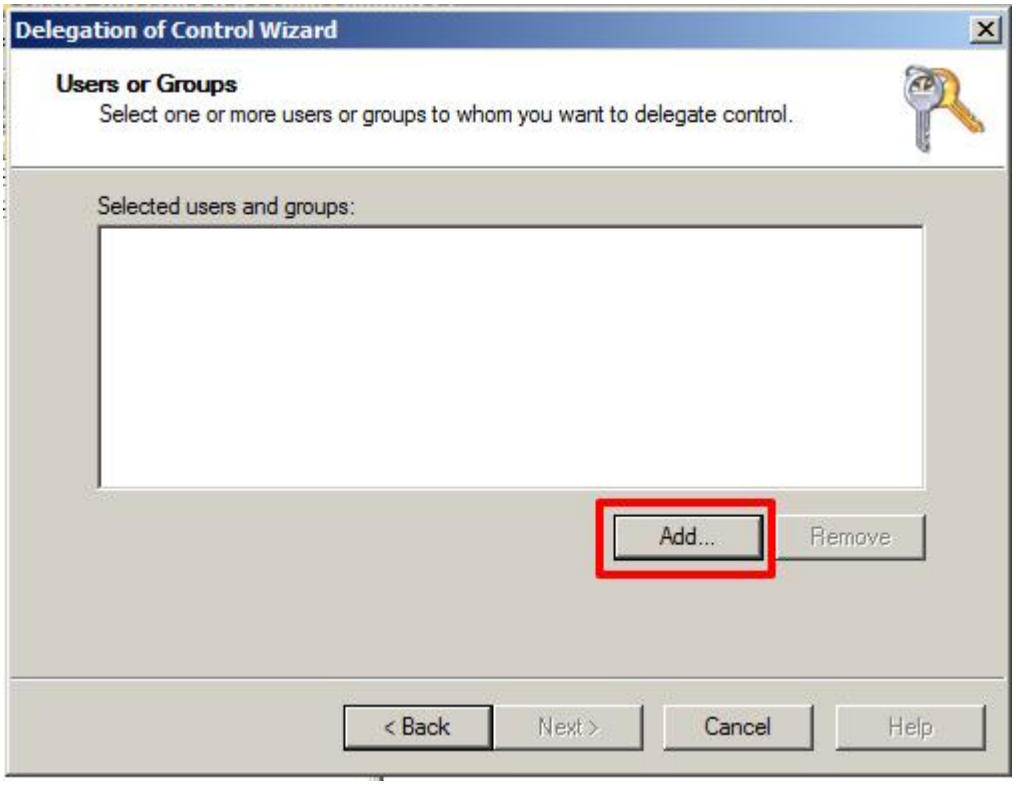


This launches the Delegation of Control Wizard, and we click Next.

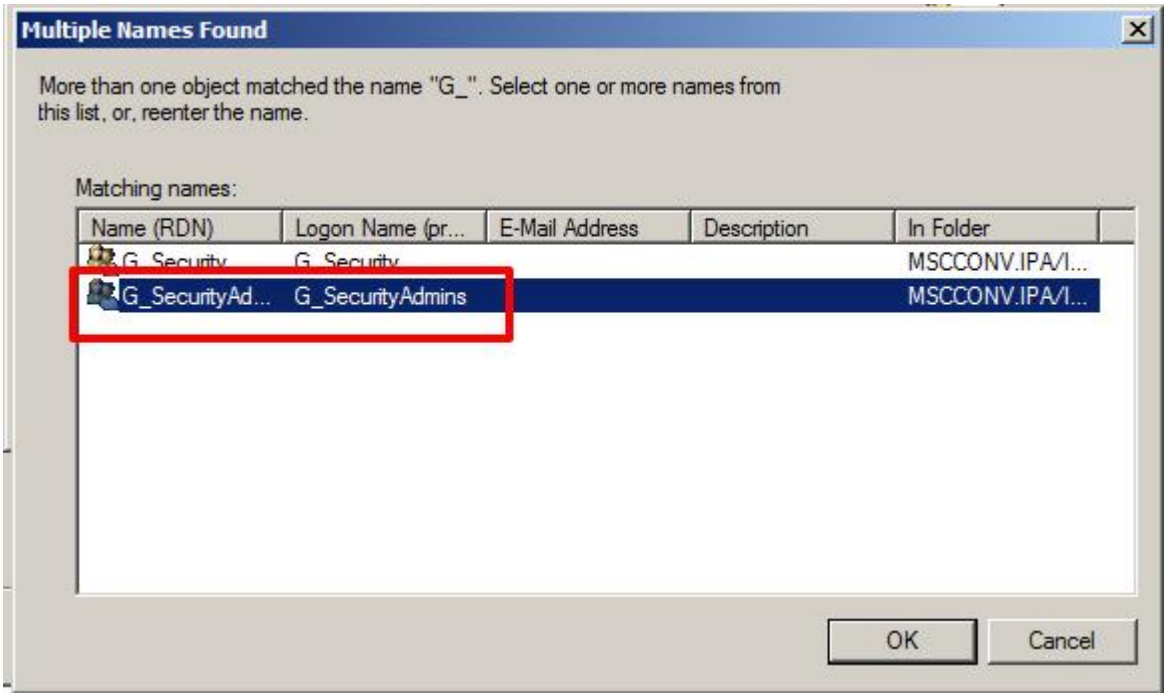
Delegation of Control Wizard
Welcome to the Delegation of Control Wizard
This wizard helps you delegate control of Active Directory objects. You can grant users permission to manage users, groups, computers, organizational units, and other objects stored in Active Directory Domain Services.
To continue, click Next.
< Back
Next >
Cancel
Help

[21] http://technet.microsoft.com/en-us/library/cc732524.aspx. Accessed July 10, 2014.

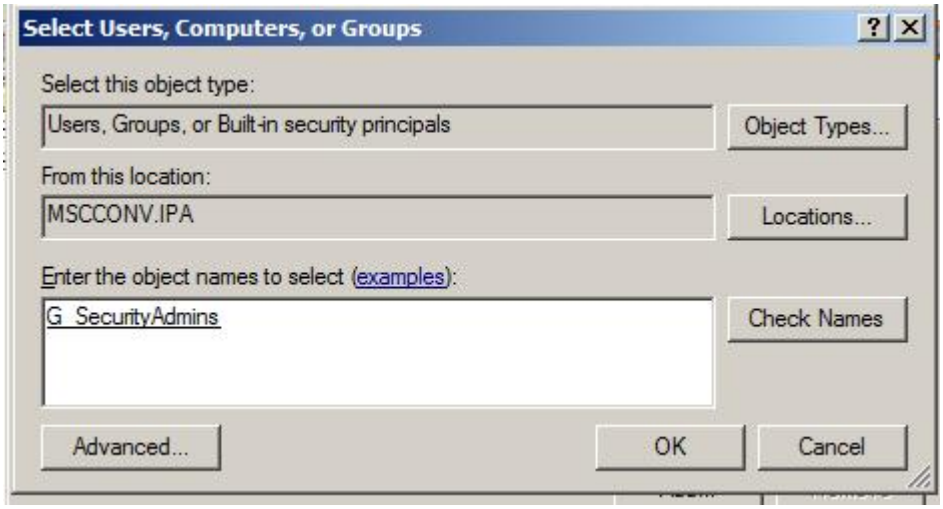
We then click Add to add a user or group to whom we wish to delegate control.



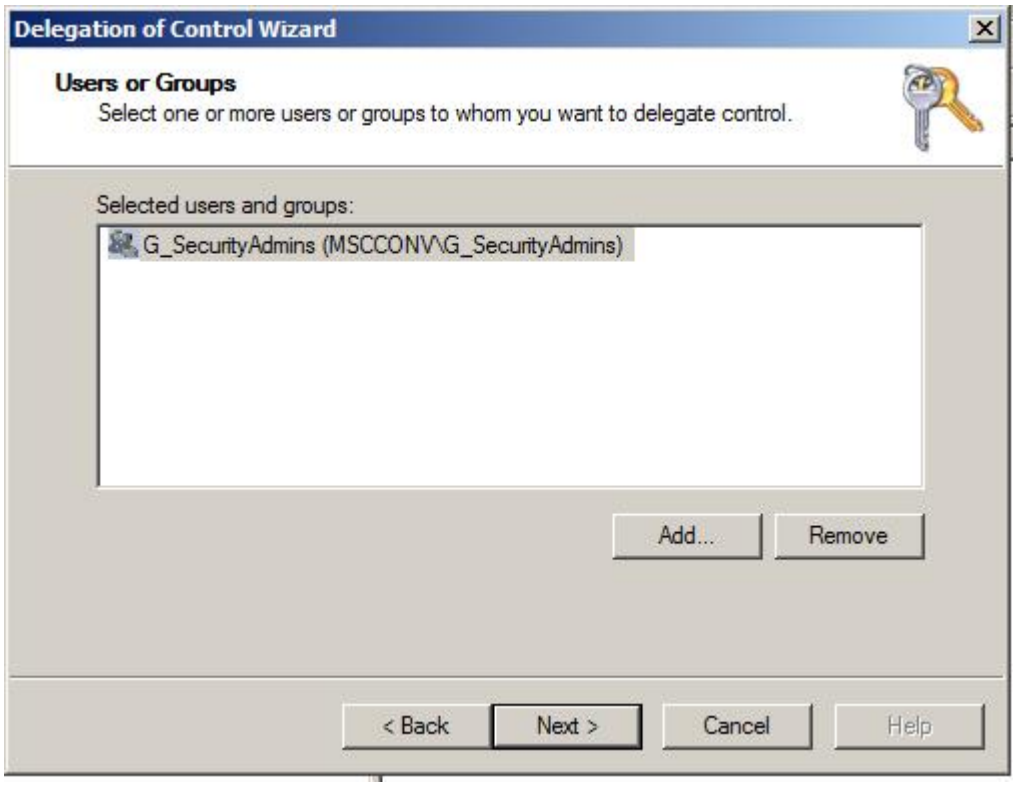
We can then type in the name of the group, in our case the G_SecurityAdmins group, which contains our Administrator users, and click Find, and then select the correct group from the groups found.



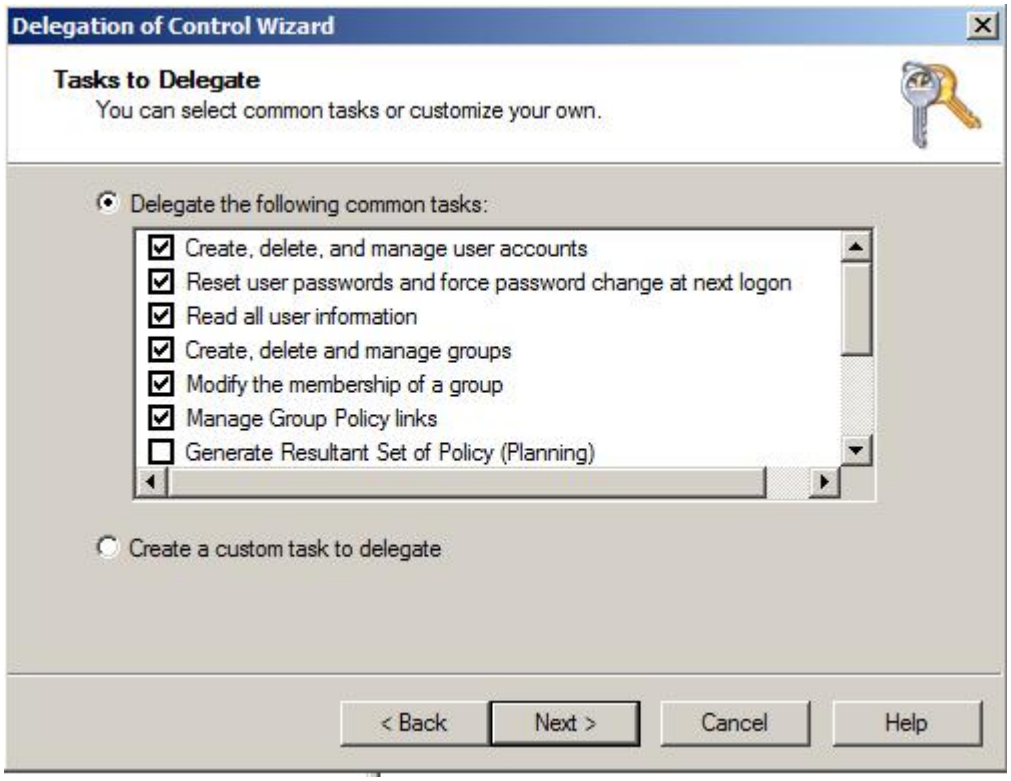
When the group has been selected we click OK.



We then highlight the selected group and click Next.



We can then select the tasks that we wish to delegate, as shown below.


Delegation of Control Wizard
Tasks to Delegate
You can select common tasks or customize your own.
Delegate the following common tasks:
Create, delete, and manage user accounts
Reset user passwords and force password change at next logon
Read all user information
Create, delete and manage groups
Modify the membership of a group
Manage Group Policy links
Generate Resultant Set of Policy (Planning)
Create a custom task to delegate
< Back
Next >
Cancel
Help

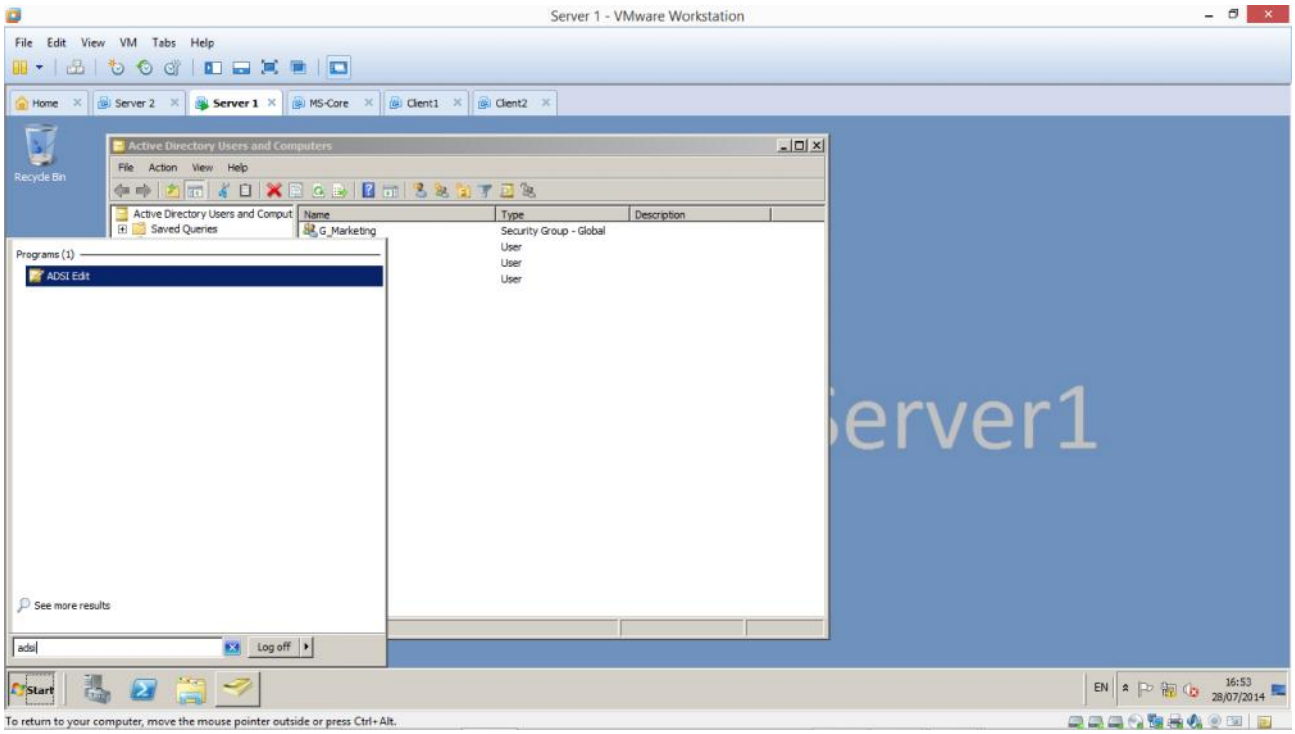
We then click Finish to complete the wizard.

Delegation of Control Wizard
Completing the Delegation of Control Wizard
You have successfully completed the Delegation of Control wizard.
You chose to delegate control of objects in the following Active Directory folder:
MSCCONV.IPA/IPA
The groups, users, or computers to which you have given control are:
G_SecurityAdmins (MSCCONV\G_SecurityAdmins)
You chose to delegate the following tasks:
To close this wizard, click Finish.
< Back
Finish
Cancel
Help

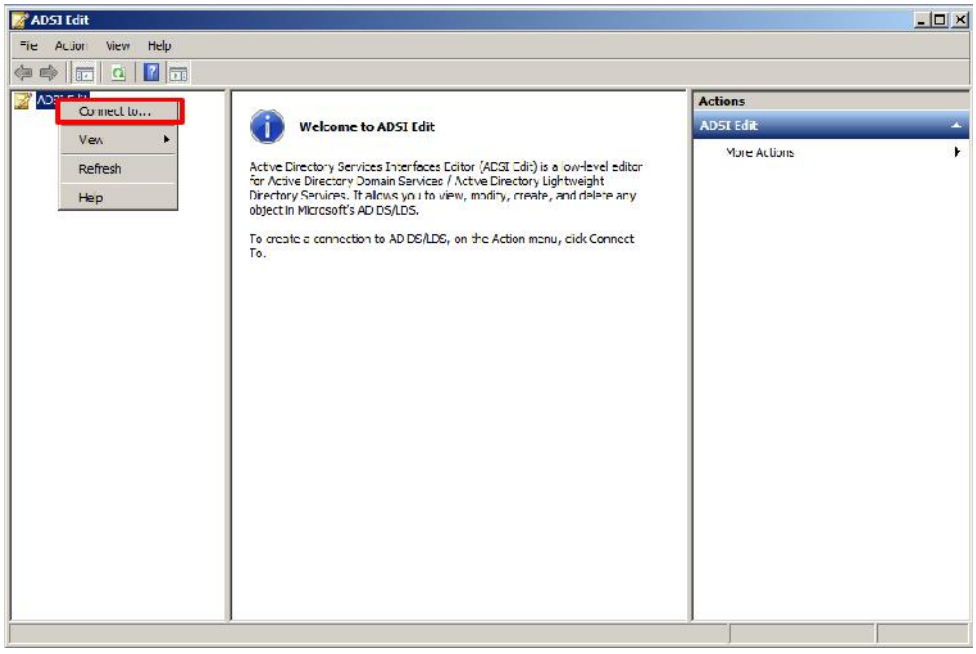
8.2.1.5 Step 5 - Create and Apply Fine-grained Password and Account Lockout Policies

As recommended by microsoft [22] we will now use a feature that was added to Windows Server 2008, whereby fine-grained password policies can be used to specify multiple password policies and apply different password restrictions and account lockout policies to different sets of users within a single domain. In our case we will create a Password Settings Object (PSO) that is to be applied to our general G_Security group that includes all users, and a second, stricter PSO that will be applied to the Admin users in our G_SecurityAdmins group. We will see how it is possible to set a higher precedence on the stricter PSO, such that it overrides the general PSO.

From the start menu on Sever1 we type ADSI into the search bar, and then open ADSI Edit.

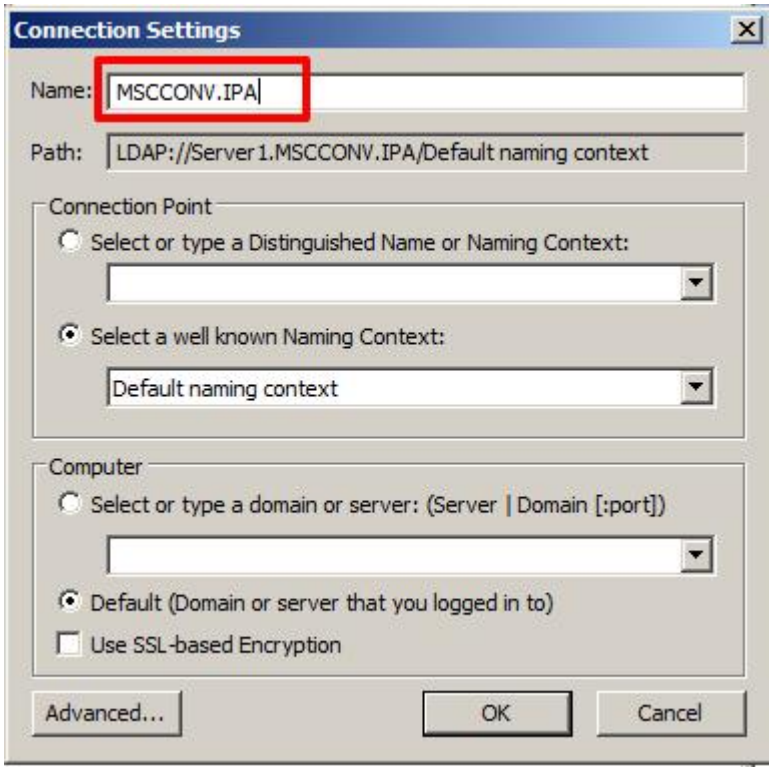


In the ADSI Edit snap-in, we right-click ADSI Edit, and then click Connect to.

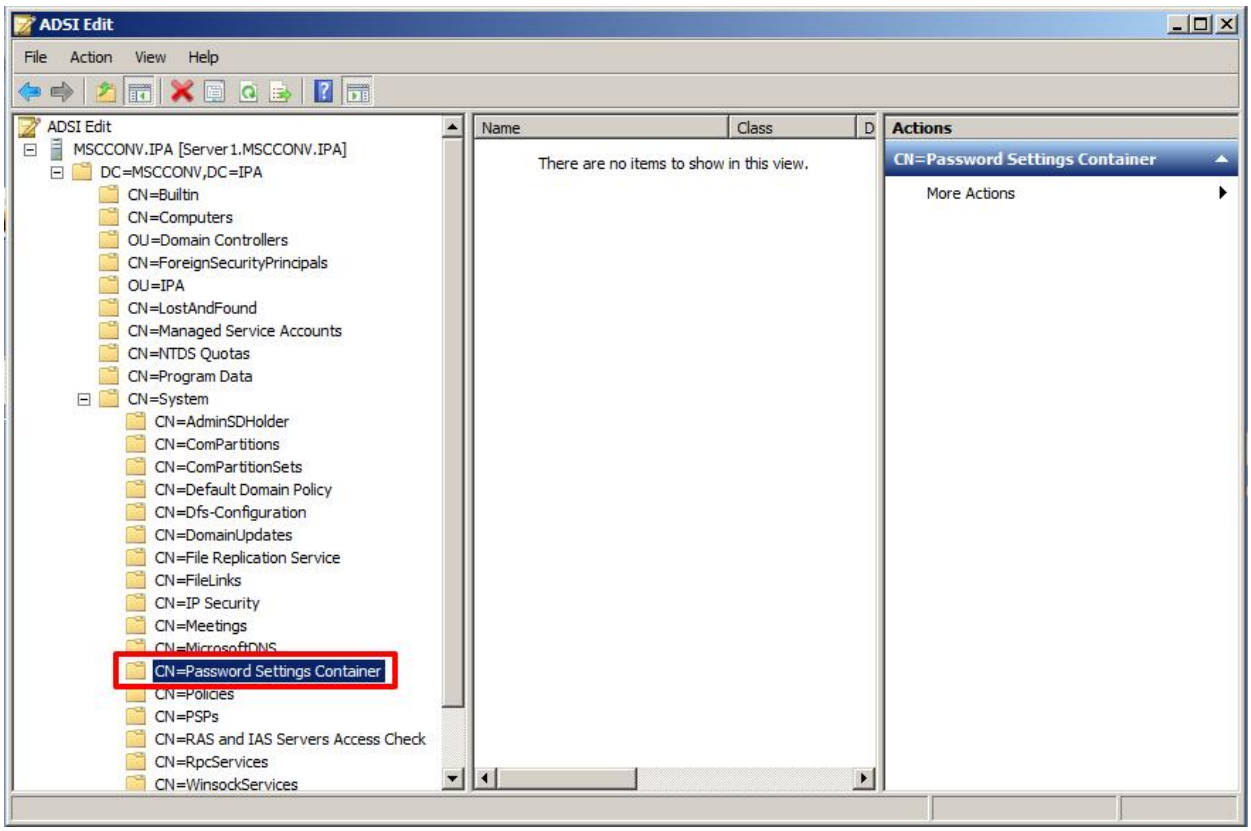

ADSI Edit
File Action View Help
Connect to...
View
Refresh
Help
Welcome to ADSI Edit
Active Directory Services Interfaces Editor (ADSI Edit) is a low-level editor for Active Directory Domain Services / Active Directory Lightweight Directory Services. It allows you to view, modify, create, and delete any object in Microsoft's AD DS/LDS.
To create a connection to AD DS/LDS, on the Action menu, click Connect To.
Actions
ADSI Edit
More Actions

[22] http://technet.microsoft.com/en-us/library/cc770842(v=ws.10).aspx. Accessed July 16, 2014

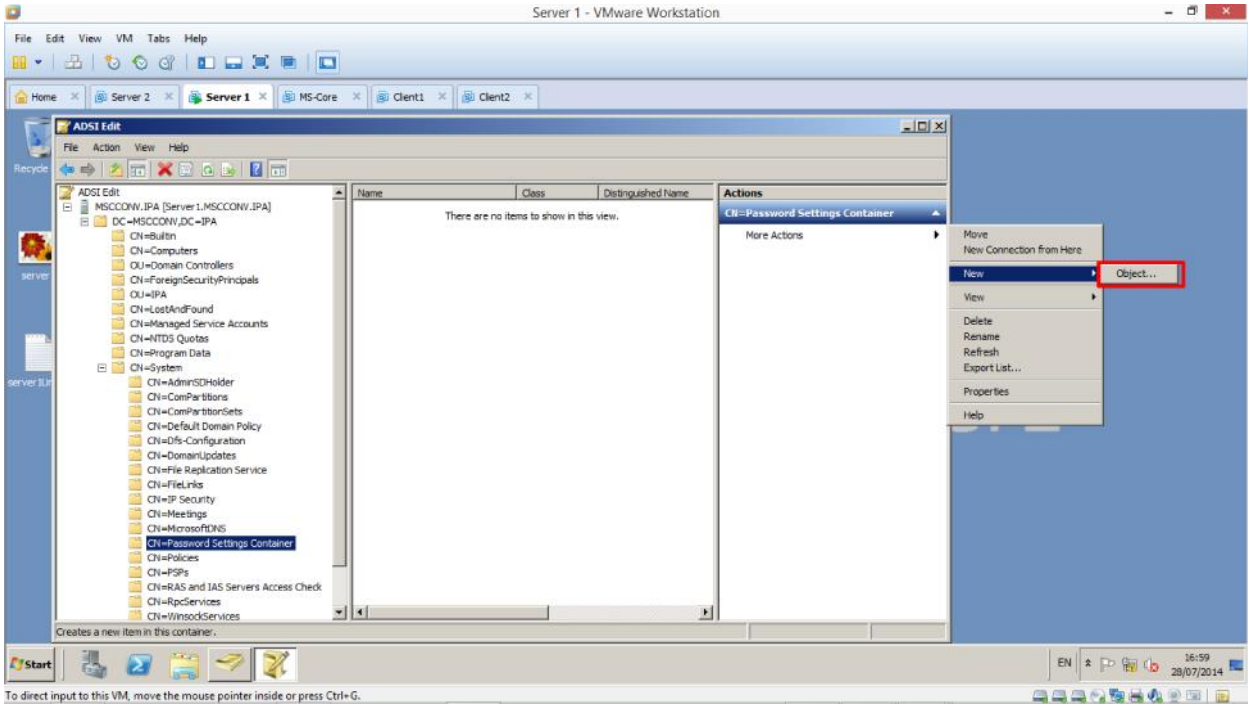
In Name, we enter the fully qualified domain name (FQDN) of the domain in which we want to create the PSO, and then click OK



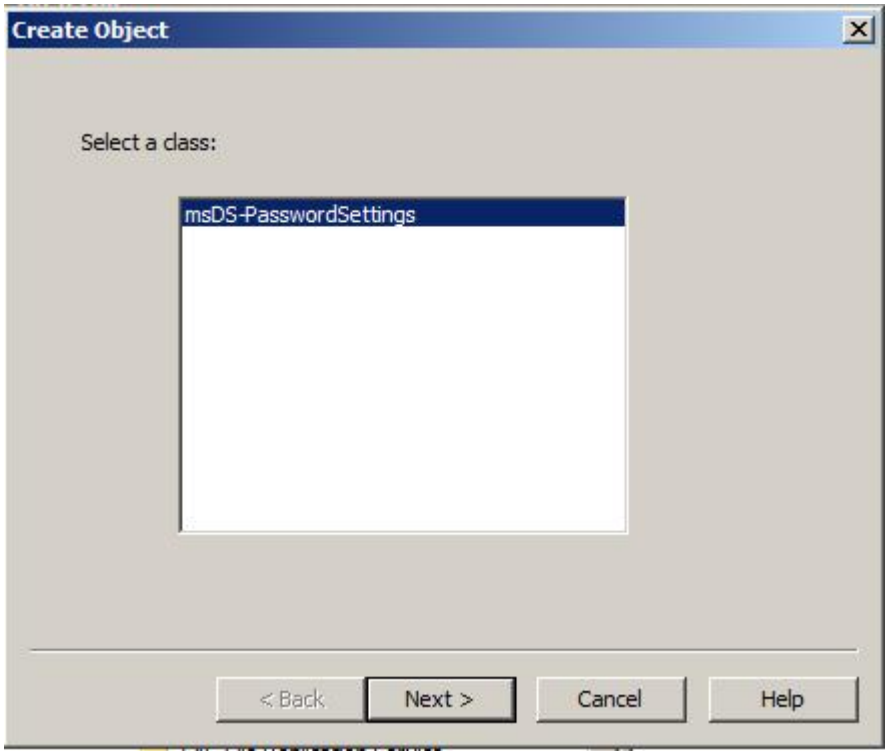
We then expand our domain, and then expand DC=MSCCONV,DC=IPA, and then expand CN=System, and then double click CN=Password Settings Container. We can see any PSO objects that have been created in our domain.



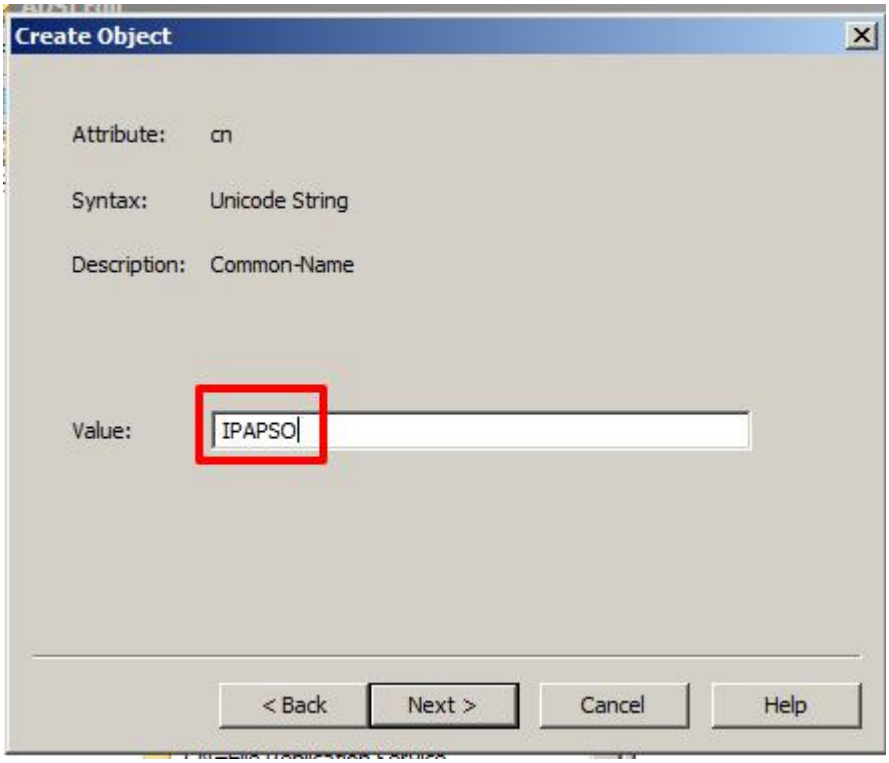
We then right-click CN=Password Settings Container, click New, and then click Object.



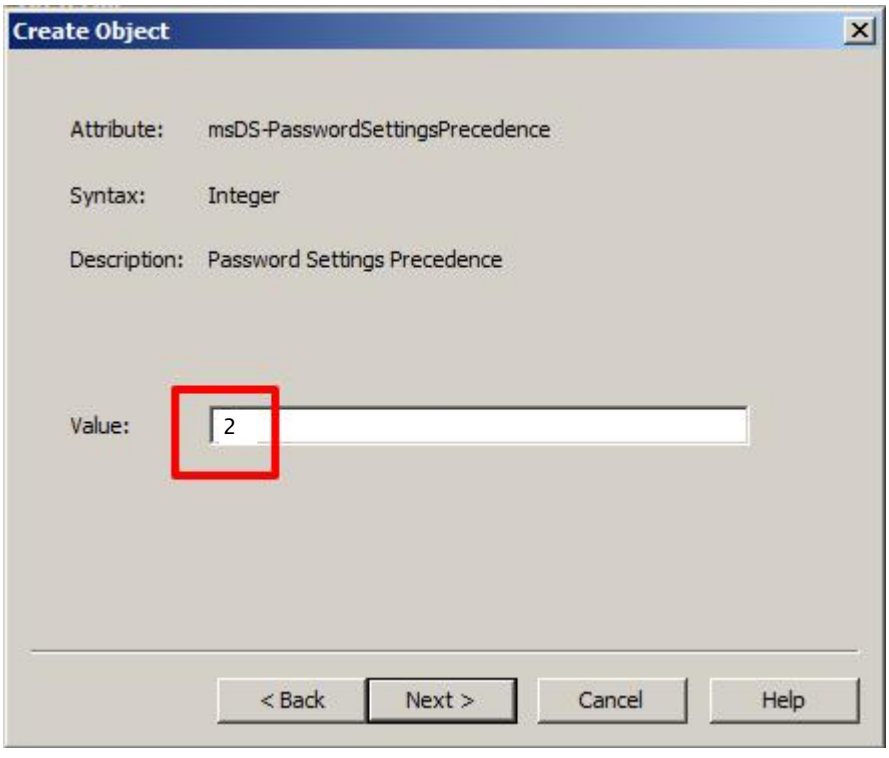
In the Create Object dialog box, under Select a class, we click msDS-PasswordSettings, and then click Next.



In Value, we type the name of the new PSO, and then click Next.

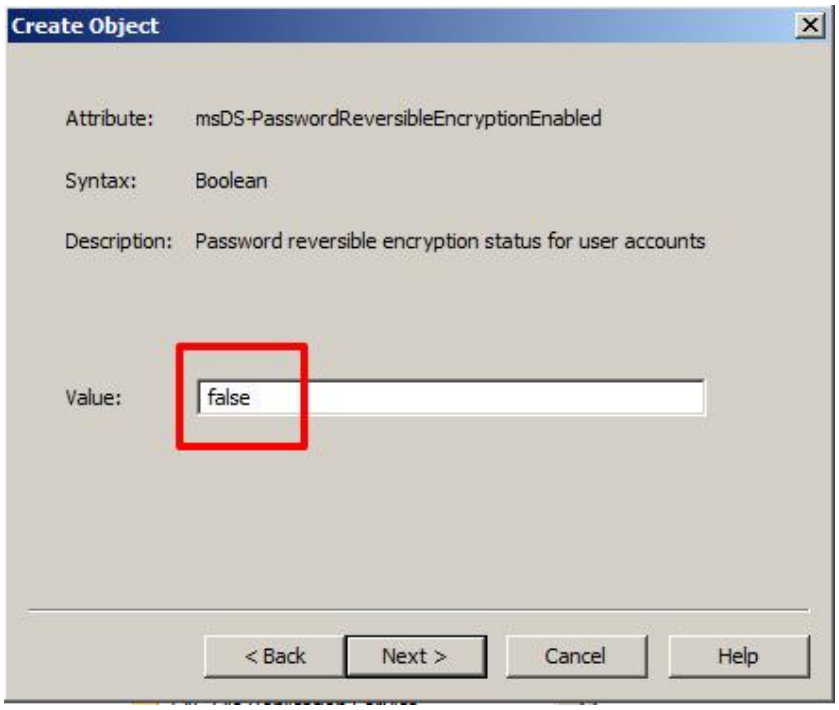


We then set the precedence of the PSO as 2 as we will subsequently create a higher precedence PSO.

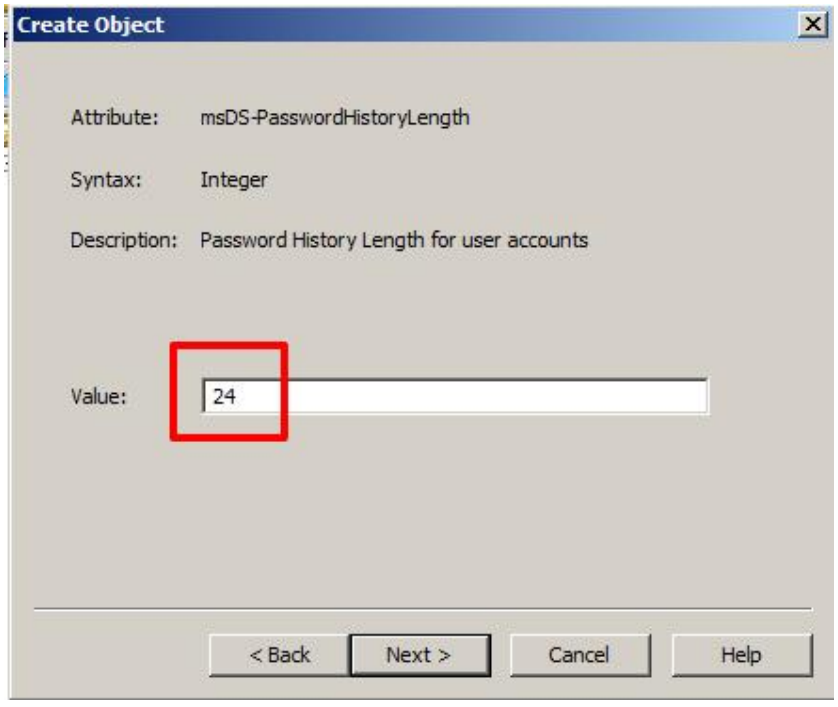


We then proceed to enter settings for the password policy in accordance with microsoft security recommendations [23].

We enter false for the msDS-PasswordReversibleEncryptionEnabled setting as this is not good practice in enterprise environments due to security vulnerabilities.

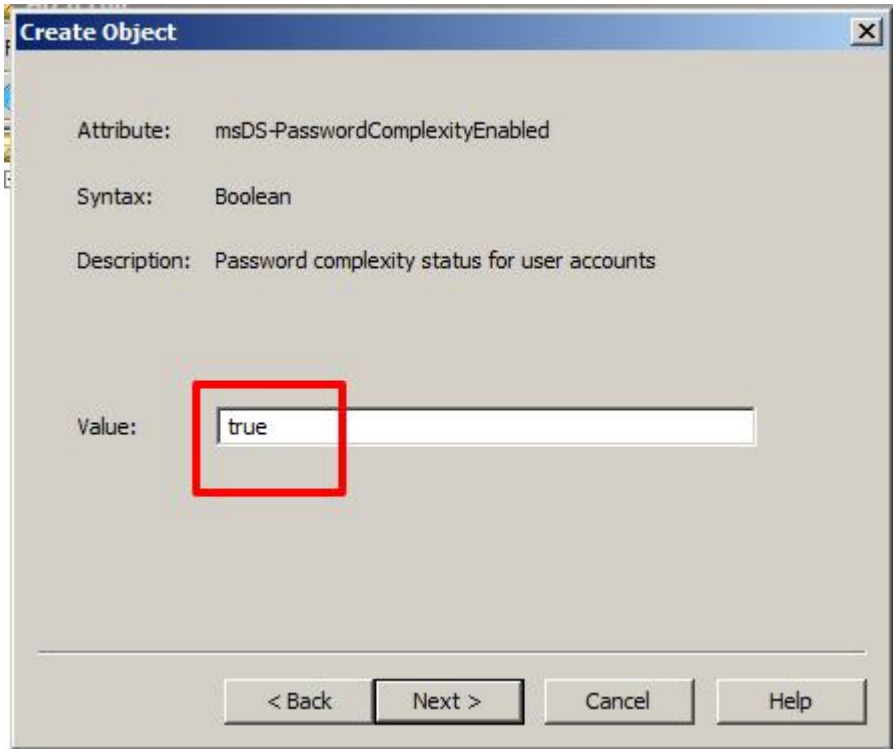


We set 24 for password history length, which defines how many new passwords must be used before a password can be reused.

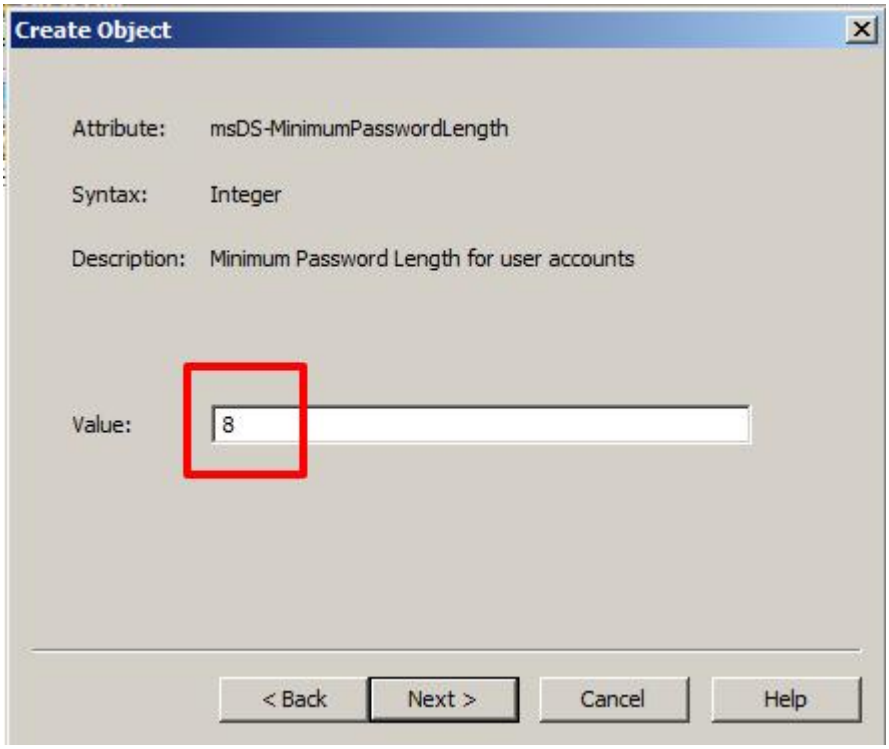


[23] http://technet.microsoft.com/en-us/library/cc784090(v=ws.10).aspx. Accessed July 16, 2014.

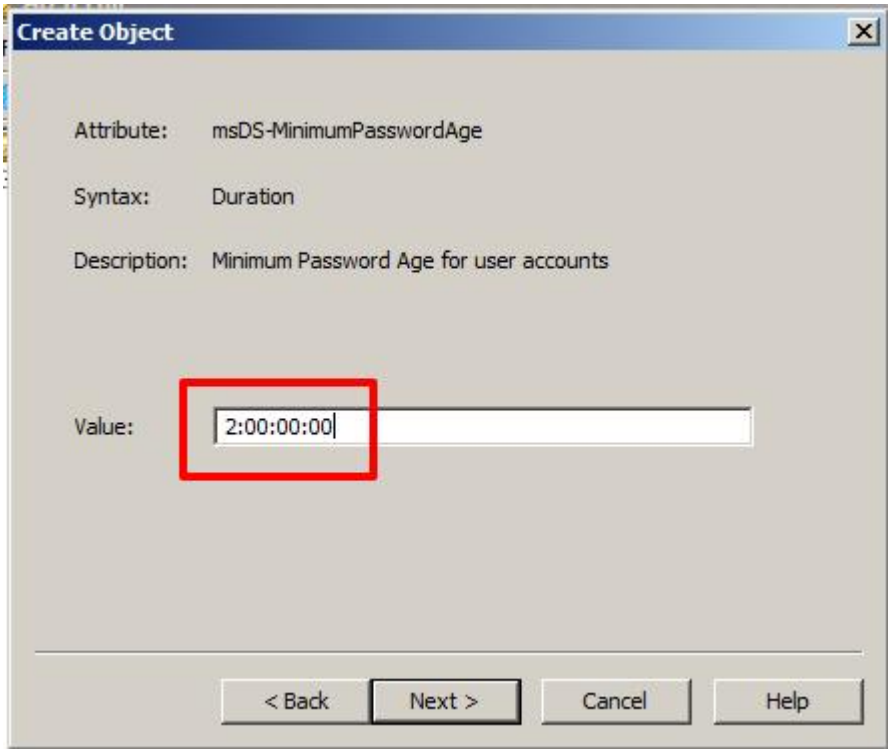
We enter true to enable the password complexity setting.



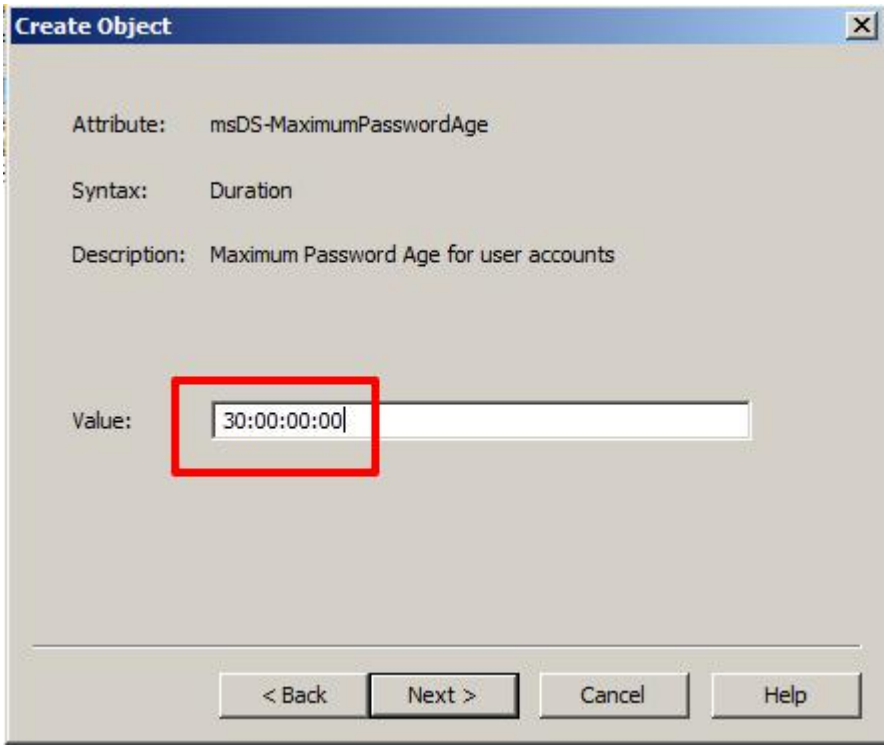
We set the minimum password length as 8 characters.



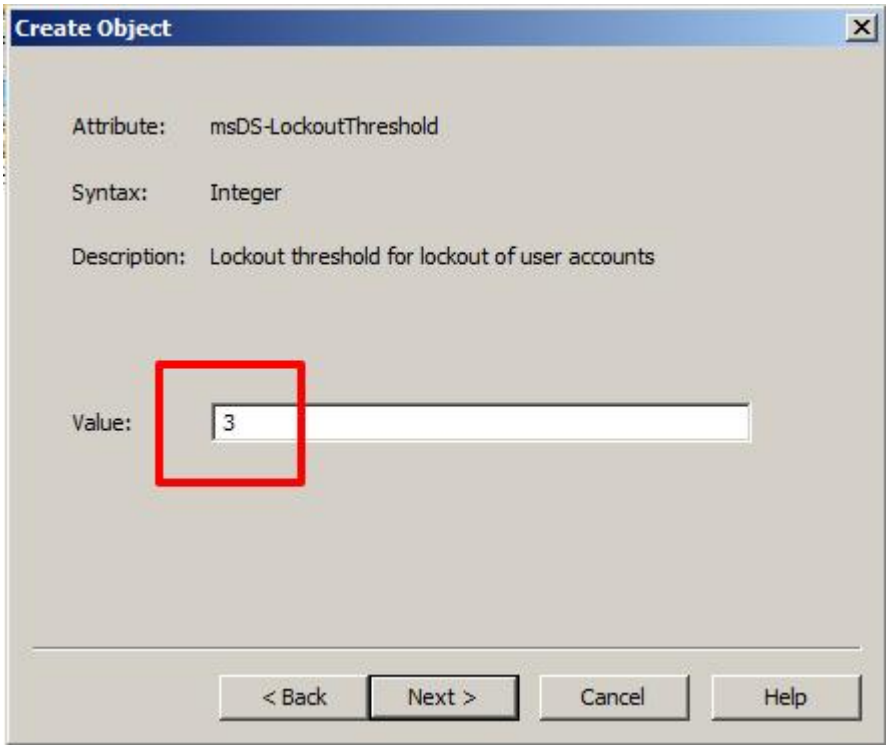
We set the minimum password age to 2 days.



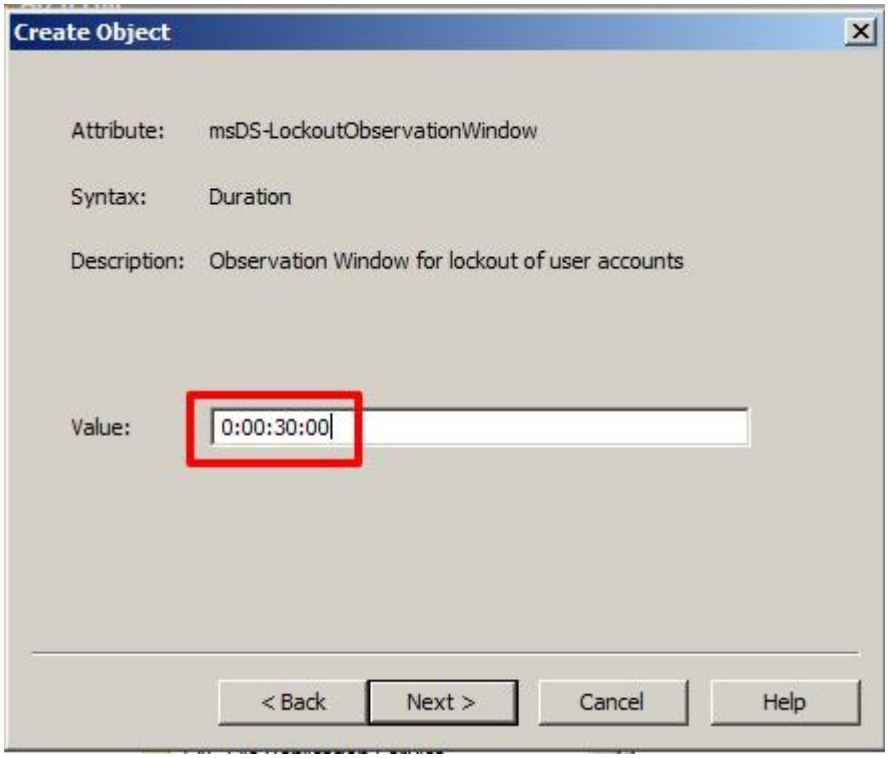
We set the maximum password age to 30 days.



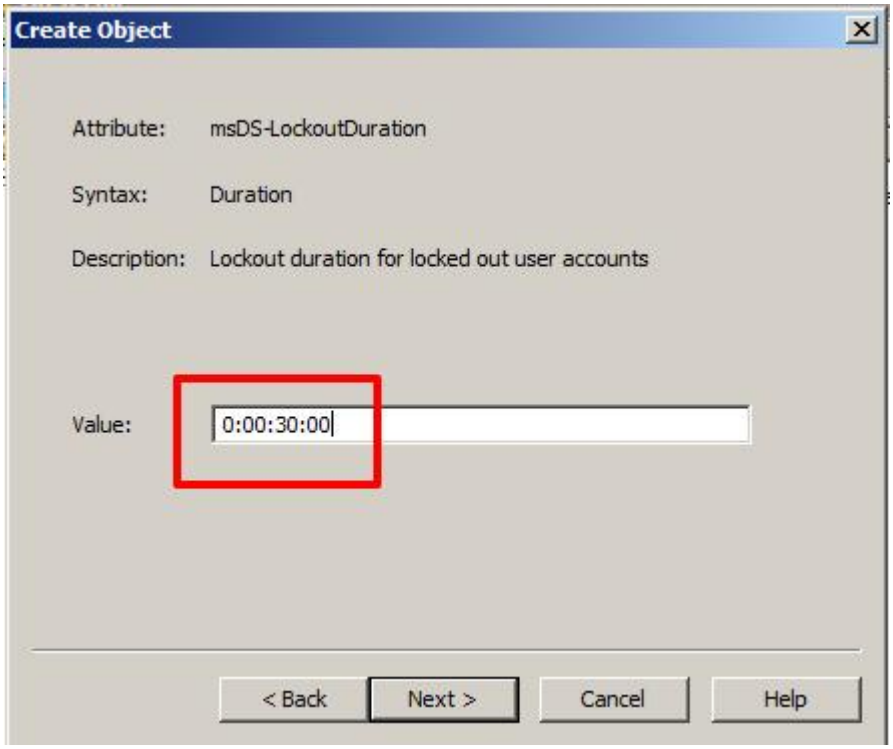
We set the lockout threshold to 3, such that 3 incorrect login attempts will be allowed before the account is locked.



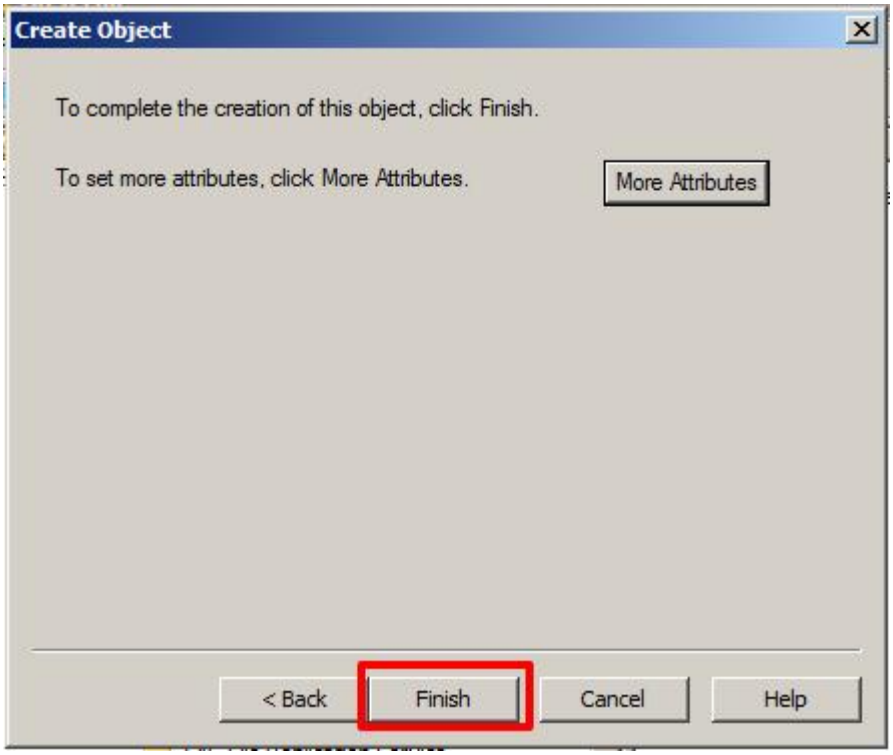
We set the Lockout Observation Window, that determines for how long incorrect logon attempts are remembered, to 30 minutes.



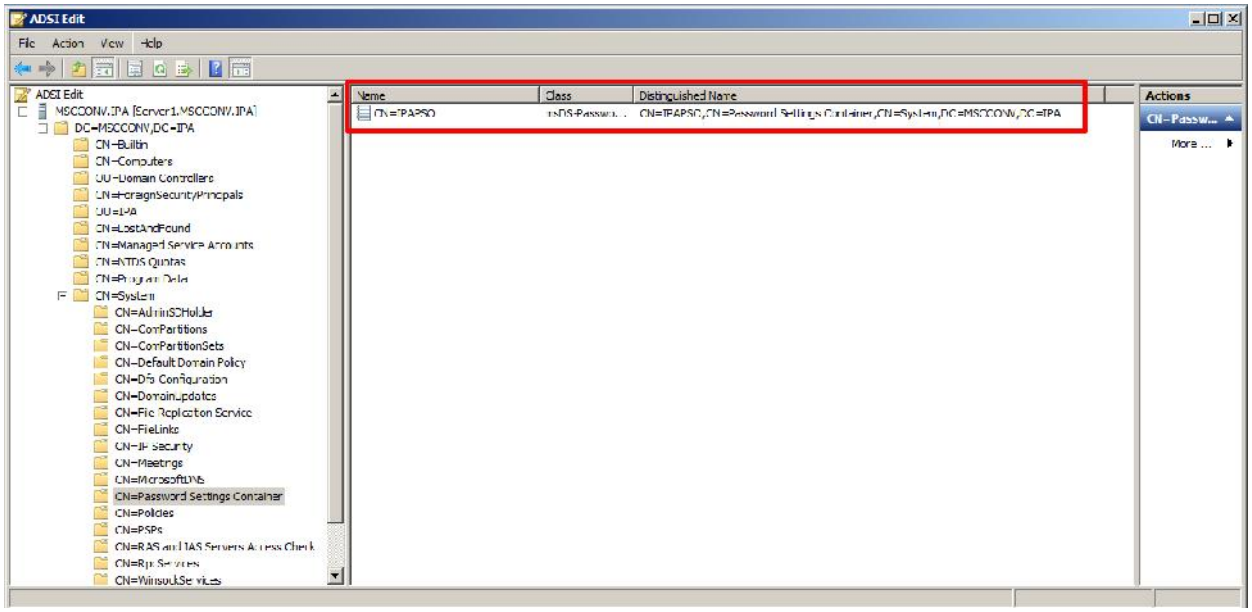
We set the Lockout duration for locked out users to 30 minutes.



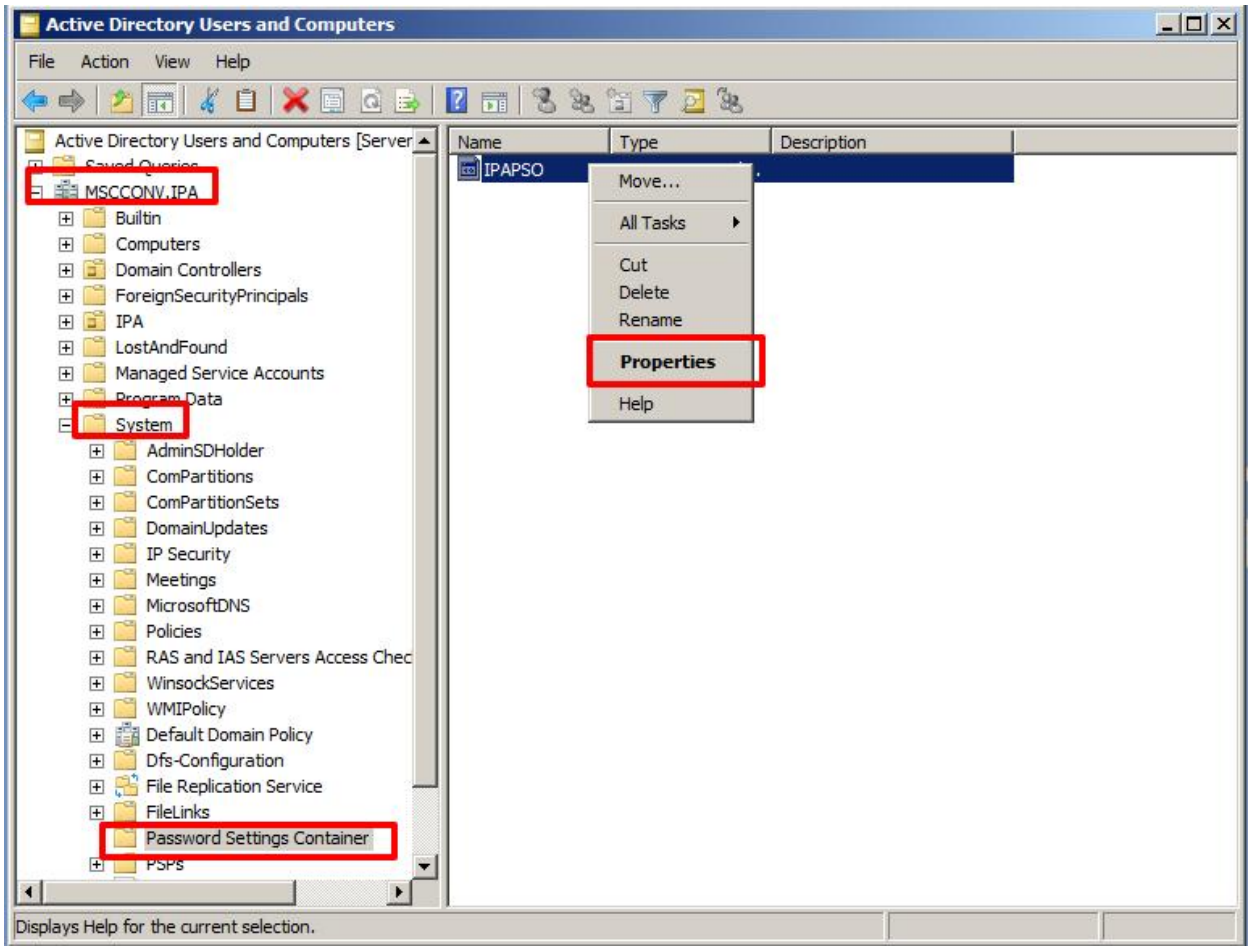
We then click Finish to complete the creation of the PSO.



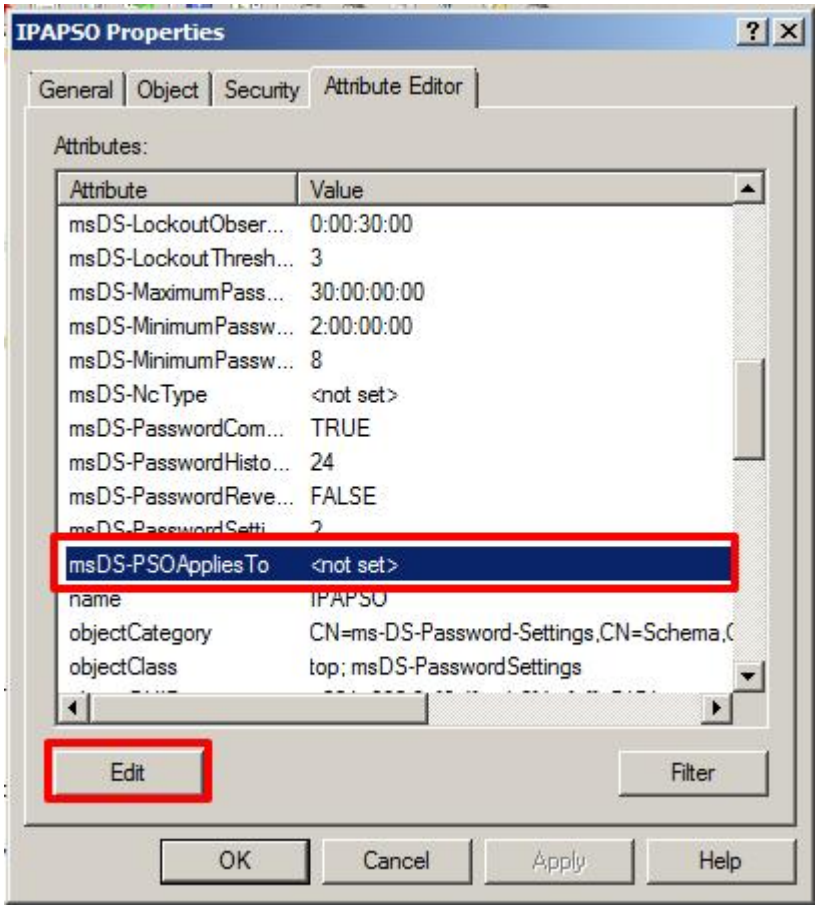
From the ADSI Edit snap-in, we can now see that the PSO has been created.



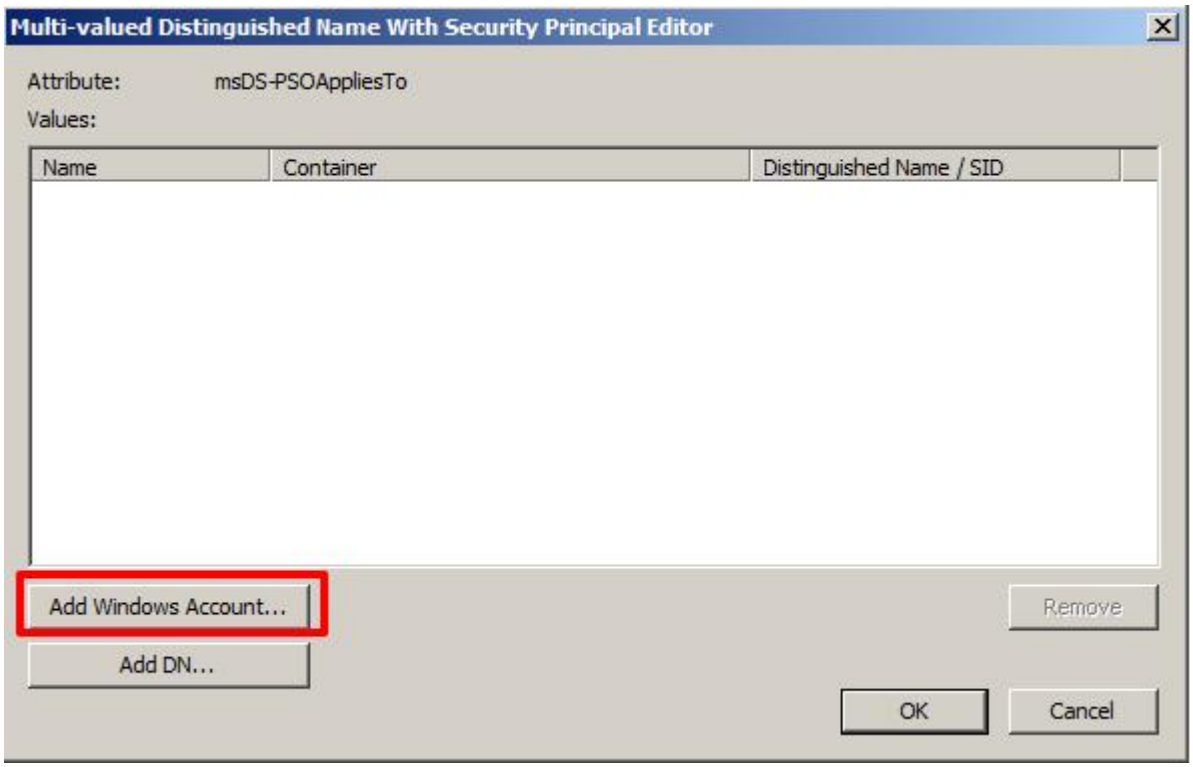
In order to apply to the PSO to a specific group, we open AD UC and navigate to our domain MSCCONV.IPA, System, Password Settings Container, which displays the PSO we have created. We then right click on the PSO and click Properties.



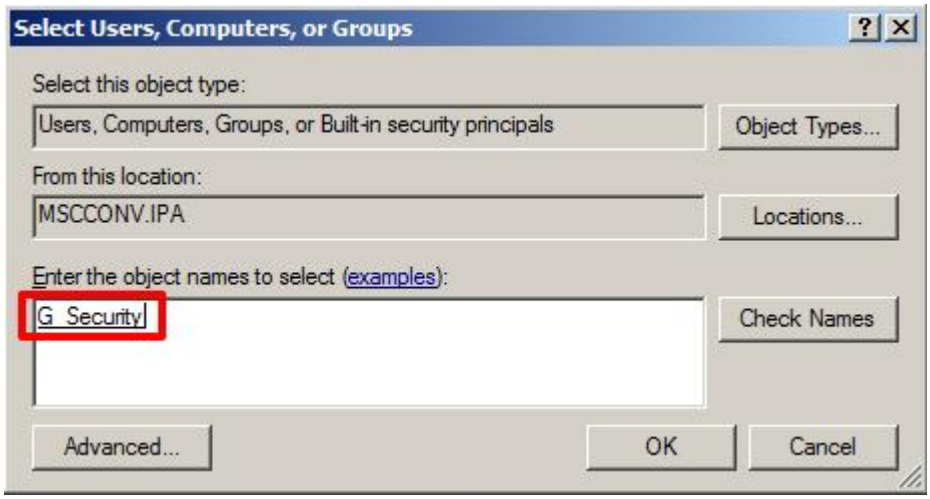
In the Attribute Editor of the Properties dialog box, we select the msDS-PSOAppliesTo attribute, which has not yet been set, and click Edit.



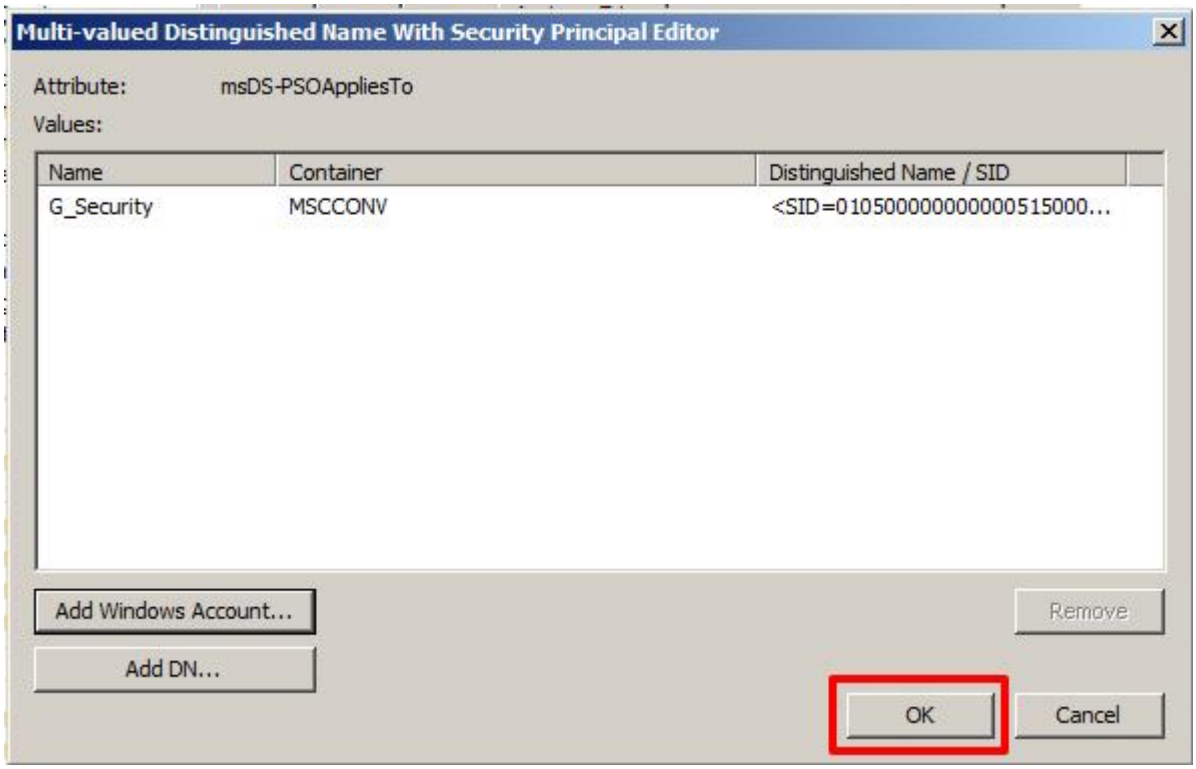
We then click Add Windows Account.



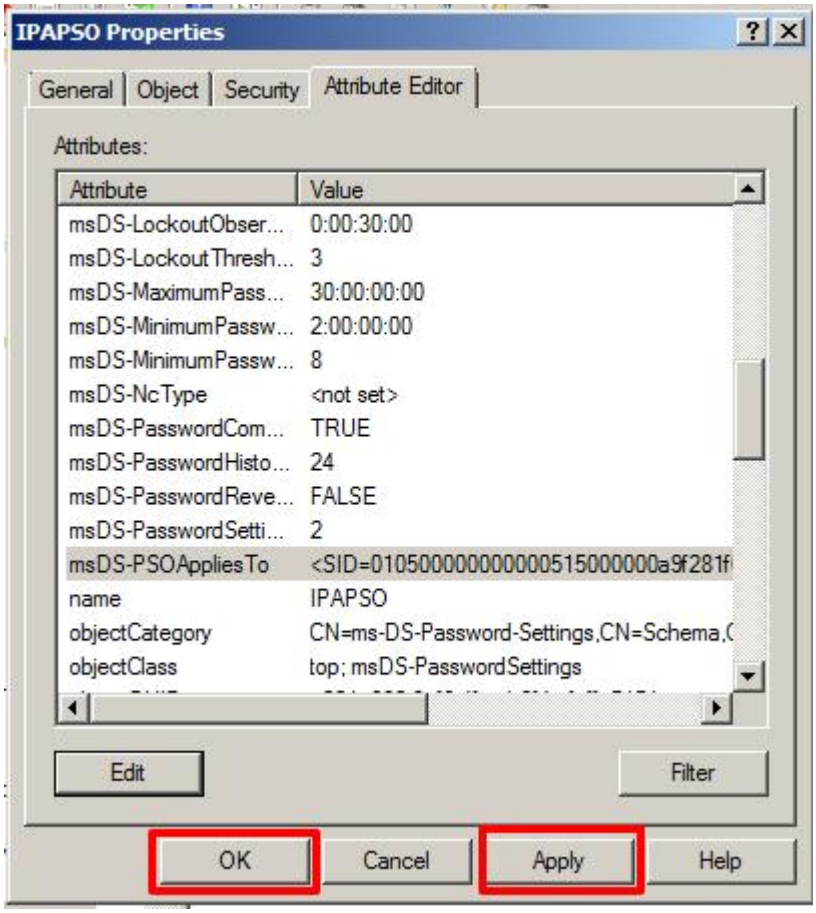
This allows us to search for our G_Security group, and then click OK.



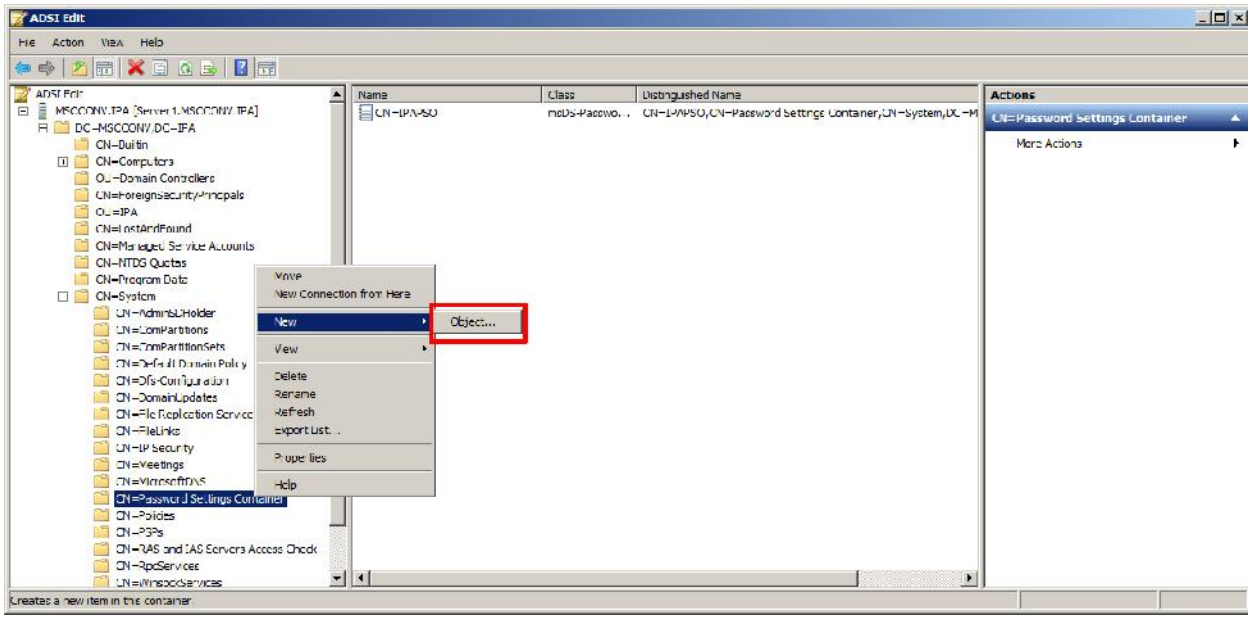
We can then see that the PSO will be applied to the group.



We then click Apply and OK.

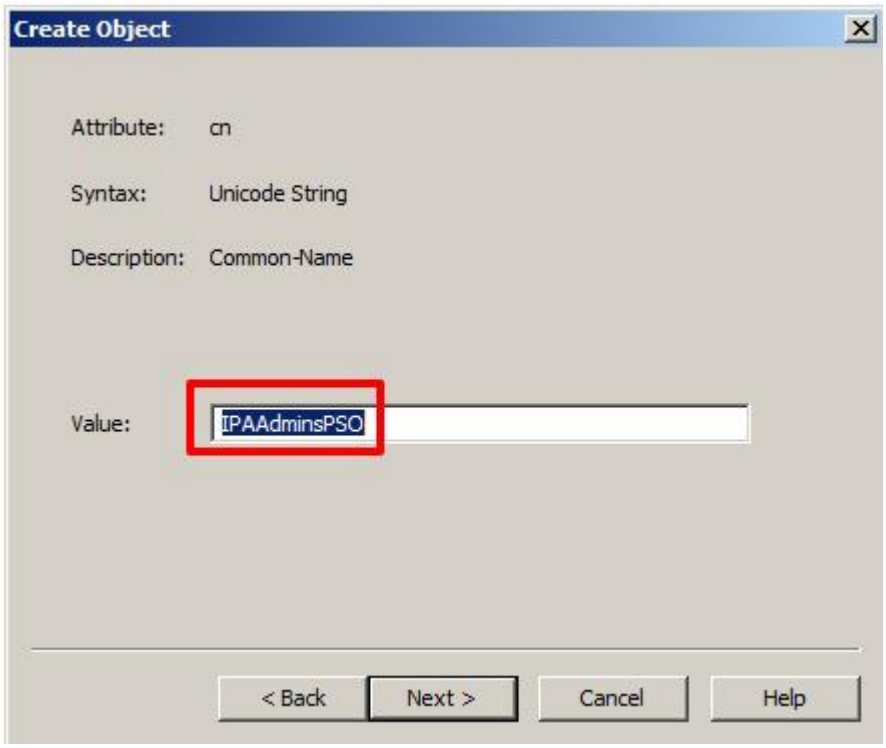


Our next step is to create a second, stricter PSO that we will aplly to our G_SecurityAdmins group. From the ADSI Edit snap-in we follow the same steps as before.

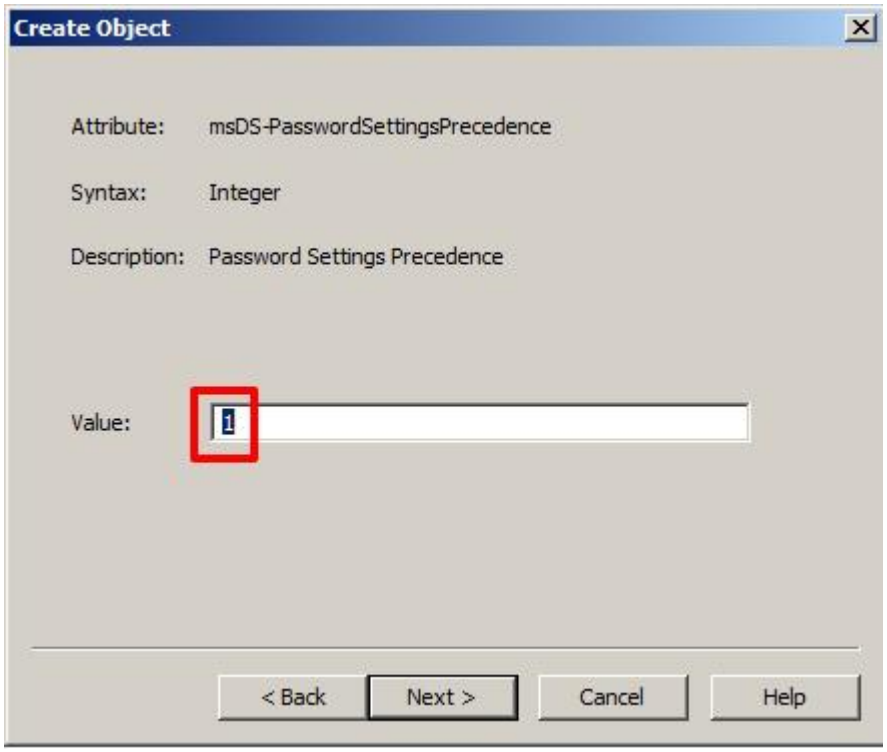


The attribute settings we set are similar to the previous PSO, with the following exceptions:

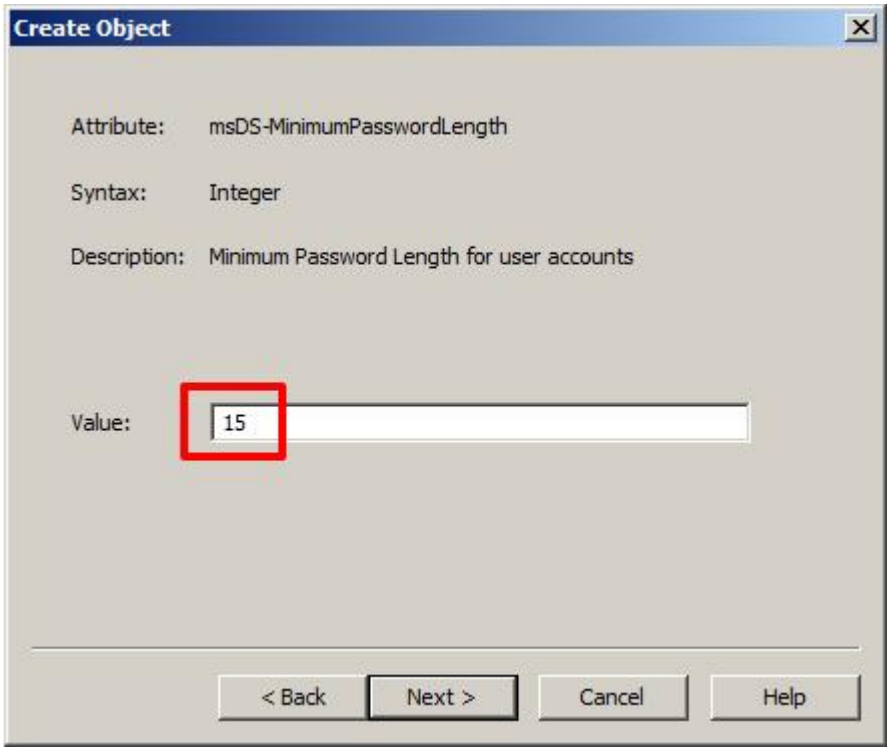
We name the PSO IPAAdminsPSO.



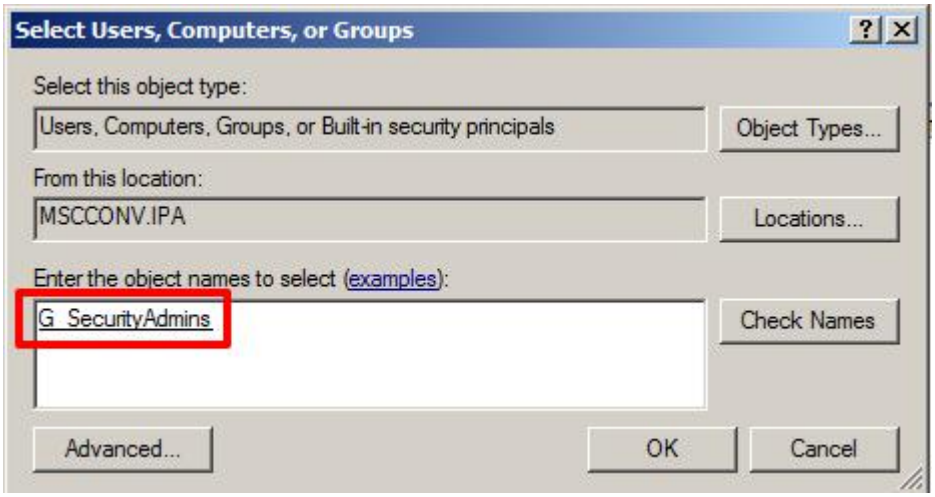
We set the precedence of the PSO to 1.

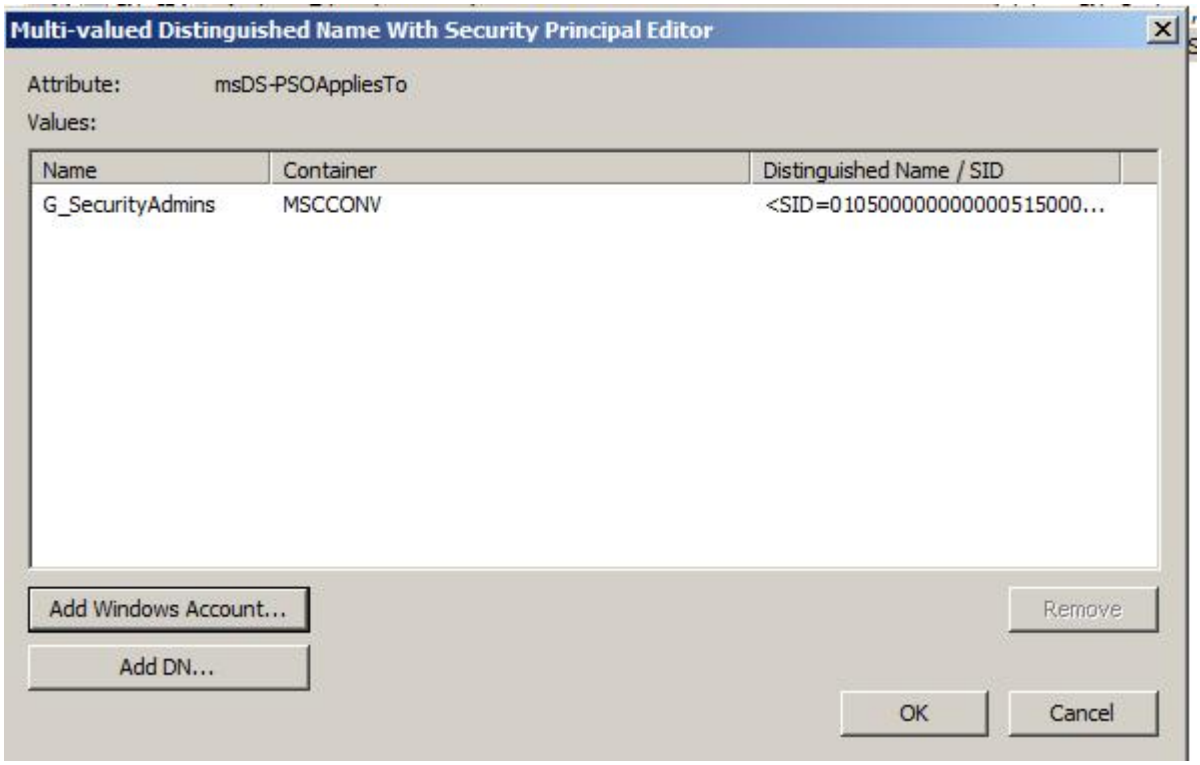


We set the minimum password length to 15.

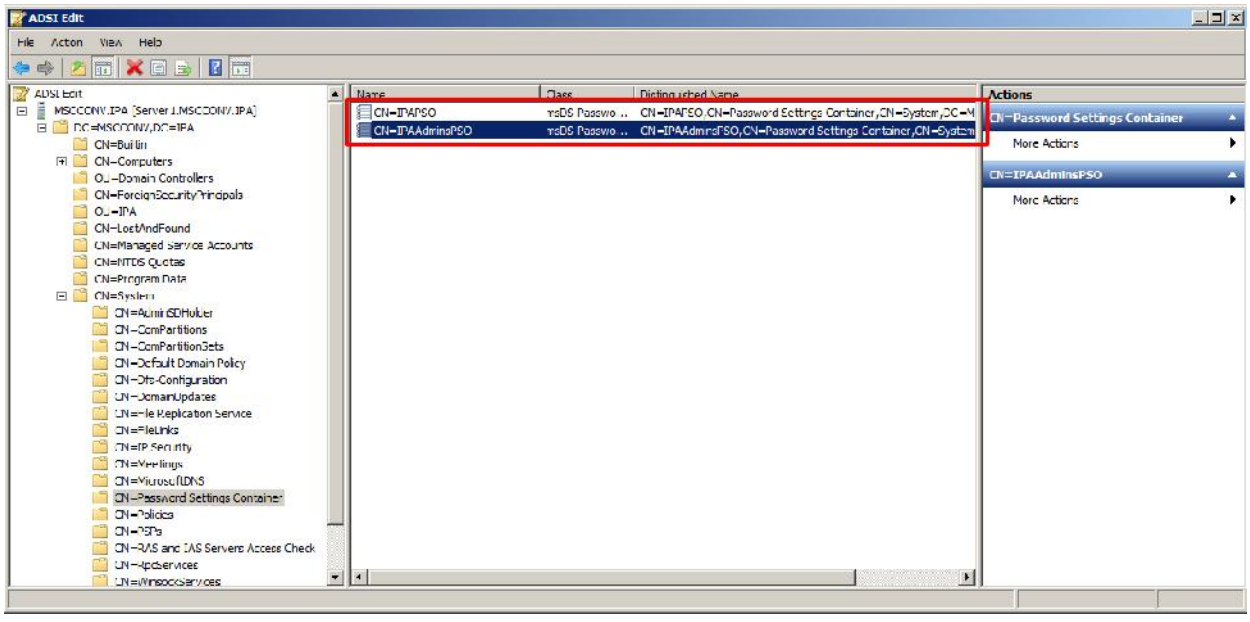


We apply to the PSO to our G_SecurityAdmins group.

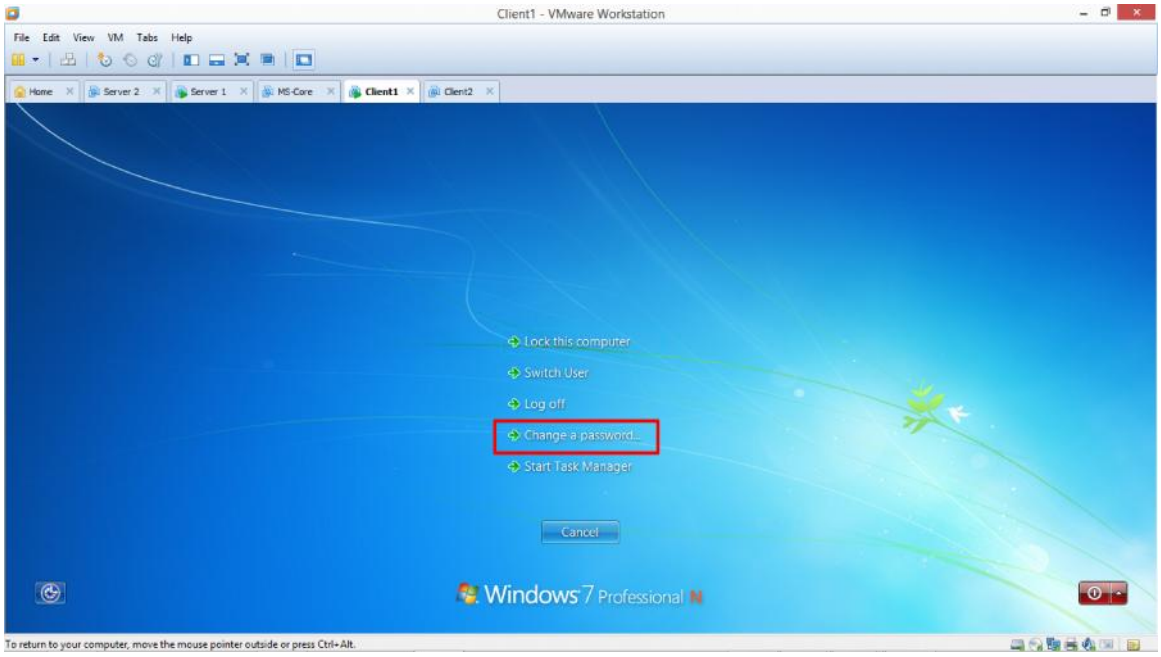




After the second PSO has been created we can then see in the ADSI Edit snap-in that there are now two PSOs in the Password Settings Container.



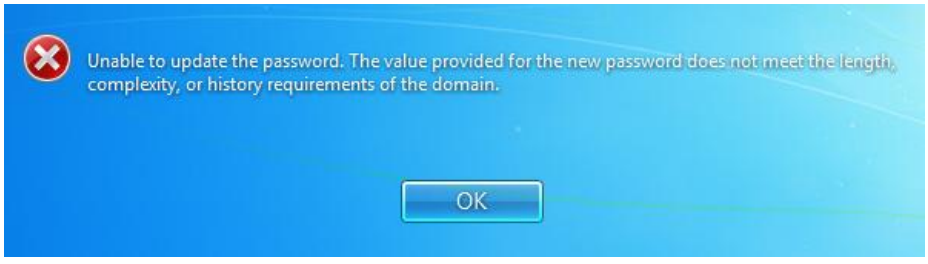
We can test that the PSOs have been applied by logging in as a user on one of our client workstations, and then attempting to change the password for the account.


Client1 - VMware Workstation
File Edit View VM Tabs Help
Home Server 2 Server 1 MS-Core Client1 Client2
Lock this computer
Switch User
Log off
Change a password...
Start Task Manager
Cancel
Windows 7 Professional N
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

We enter a simple new password that only contains letter character.

Client1 - VMware Workstation
File Edit View VM Tabs Help
Home Server 2 Server 1 MS-Core Client1 Client2
MSCCONV\user10
Log on to: MSCCONV
Cancel
Windows 7 Professional N
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

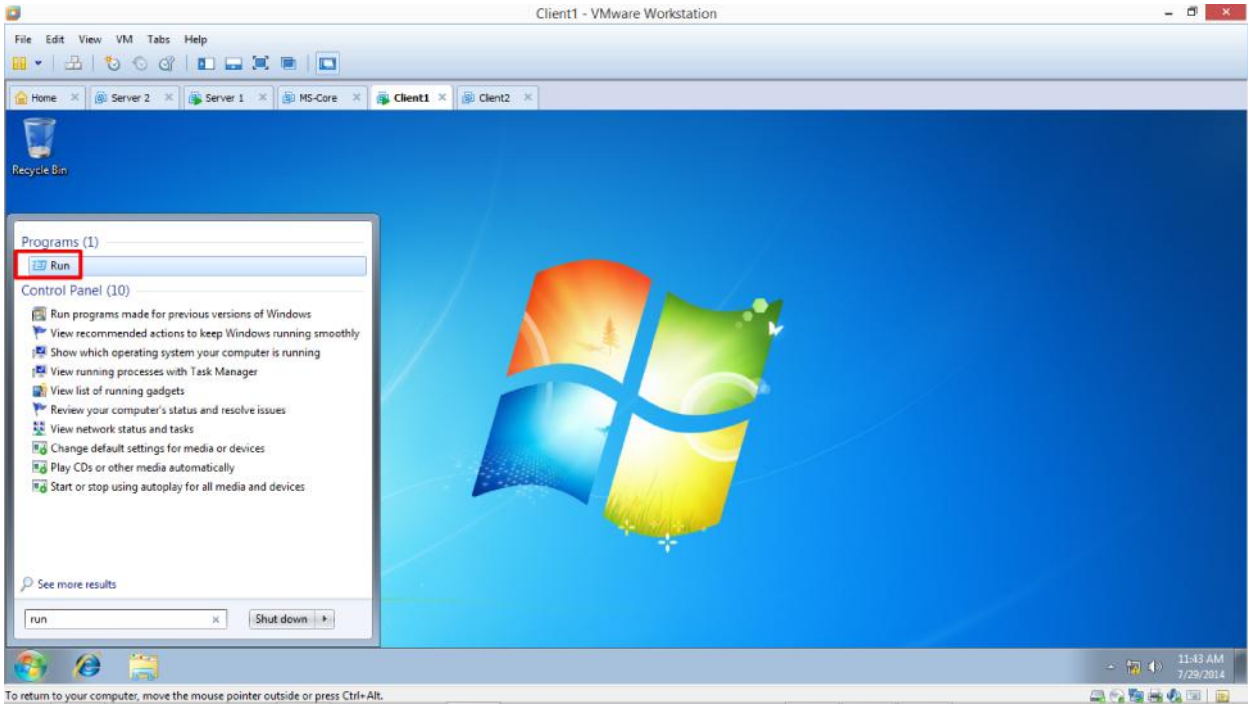
A message is generated advising that the new password does not meet the length, complexity or history requirements set for the domain.


Unable to update the password. The value provided for the new password does not meet the length, complexity, or history requirements of the domain.
OK

8.2.2 Subtask 2 - Prevent users in Marketing OU from being able to see IT OU

In order to hide an OU from specific users we will first of all confirm that users in the Marketing OU can indeed see the IT OU. To do this we log on to our client1 machine as a Marketing user, e.g. user6.

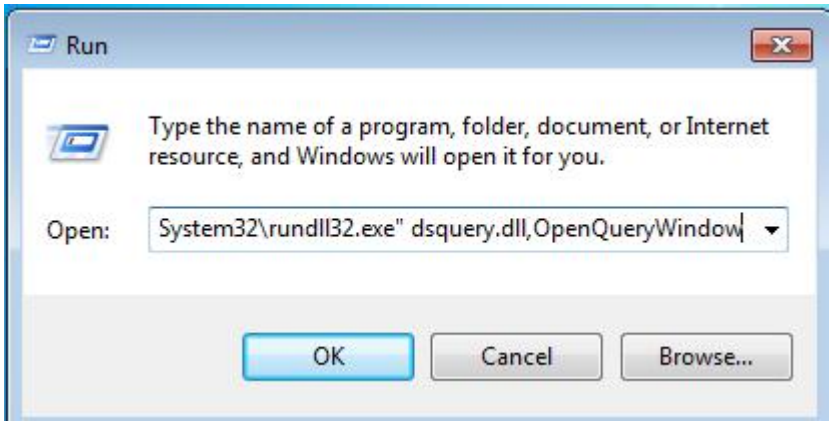
From the start menu we type Run and select the Run command.


Client1 - VMware Workstation
File Edit View VM Tabs Help
Home Server 2 Server 1 MS-Core Client1 Client2
Recycle Bin
Programs (1)
Run
Control Panel (10)
Run programs made for previous versions of Windows
View recommended actions to keep Windows running smoothly
Show which operating system your computer is running
View running processes with Task Manager
View list of running gadgets
Review your computer's status and resolve issues
View network status and tasks
Change default settings for media or devices
Play CDs or other media automatically
Start or stop using autoplay for all media and devices
See more results
run
Shut down
11:43 AM
7/29/2014
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

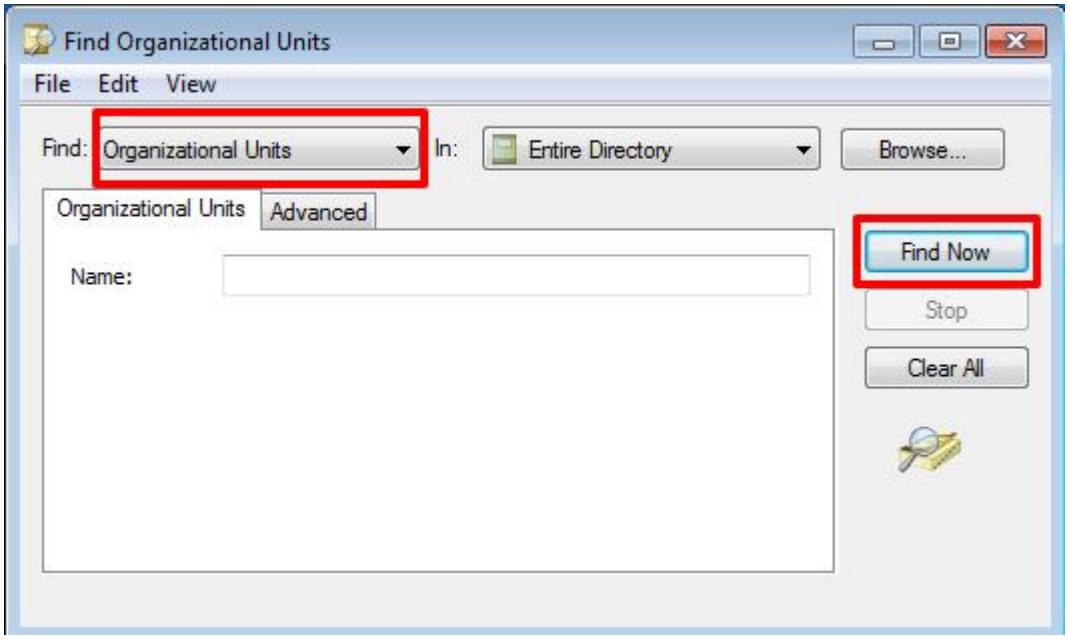
From the run command, we type:

'"C:\Windows\System32\rundll32.exe" dsquery.dll,OpenQueryWindow'

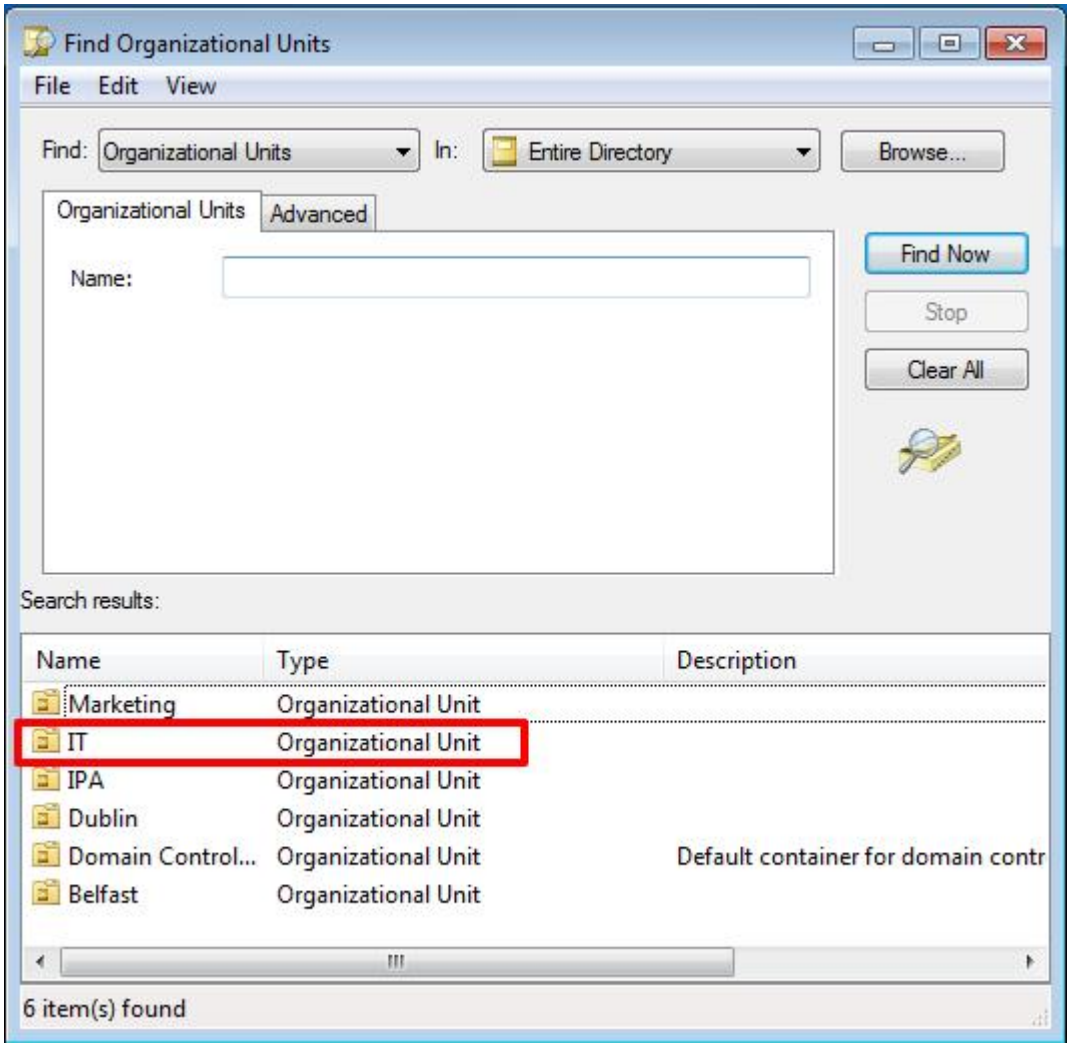
This will allow us to search for OUs on the domain available to the user we are logged on as.



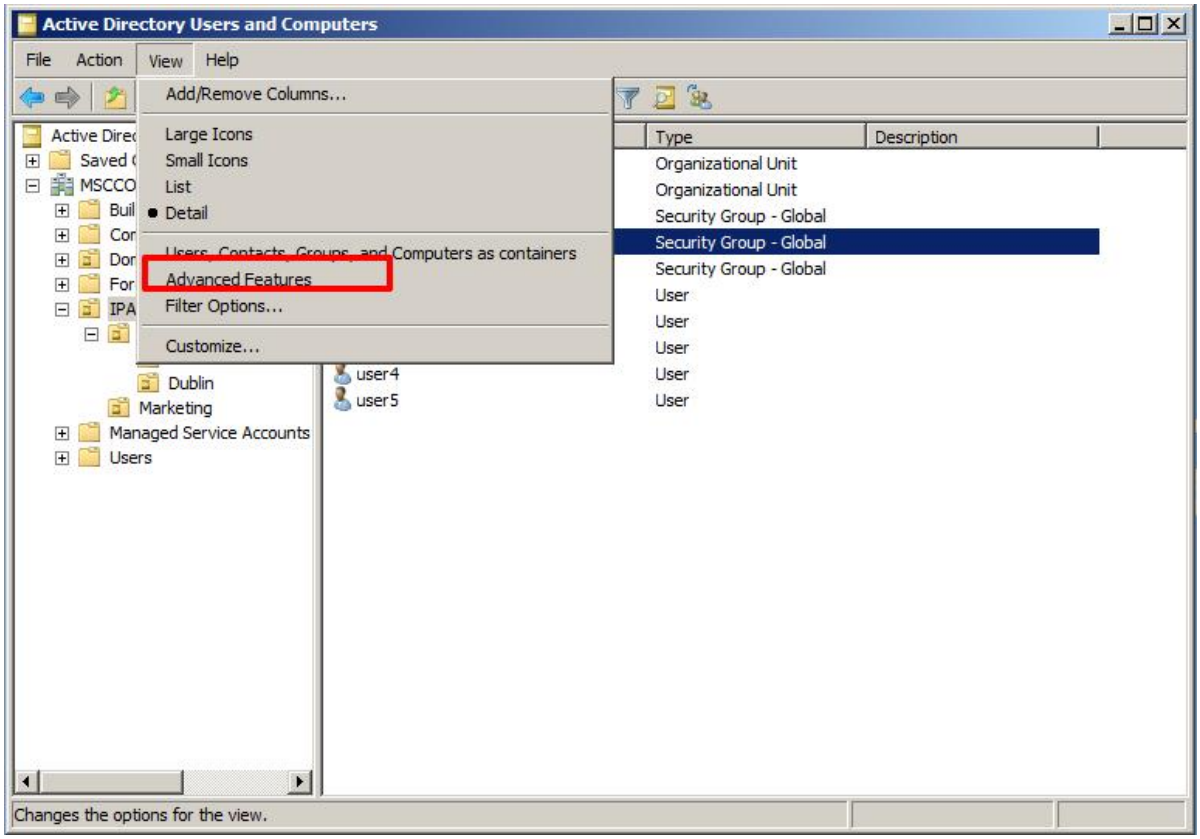
We select Organisational Units under the Find dropdown menu, and click Find Now.



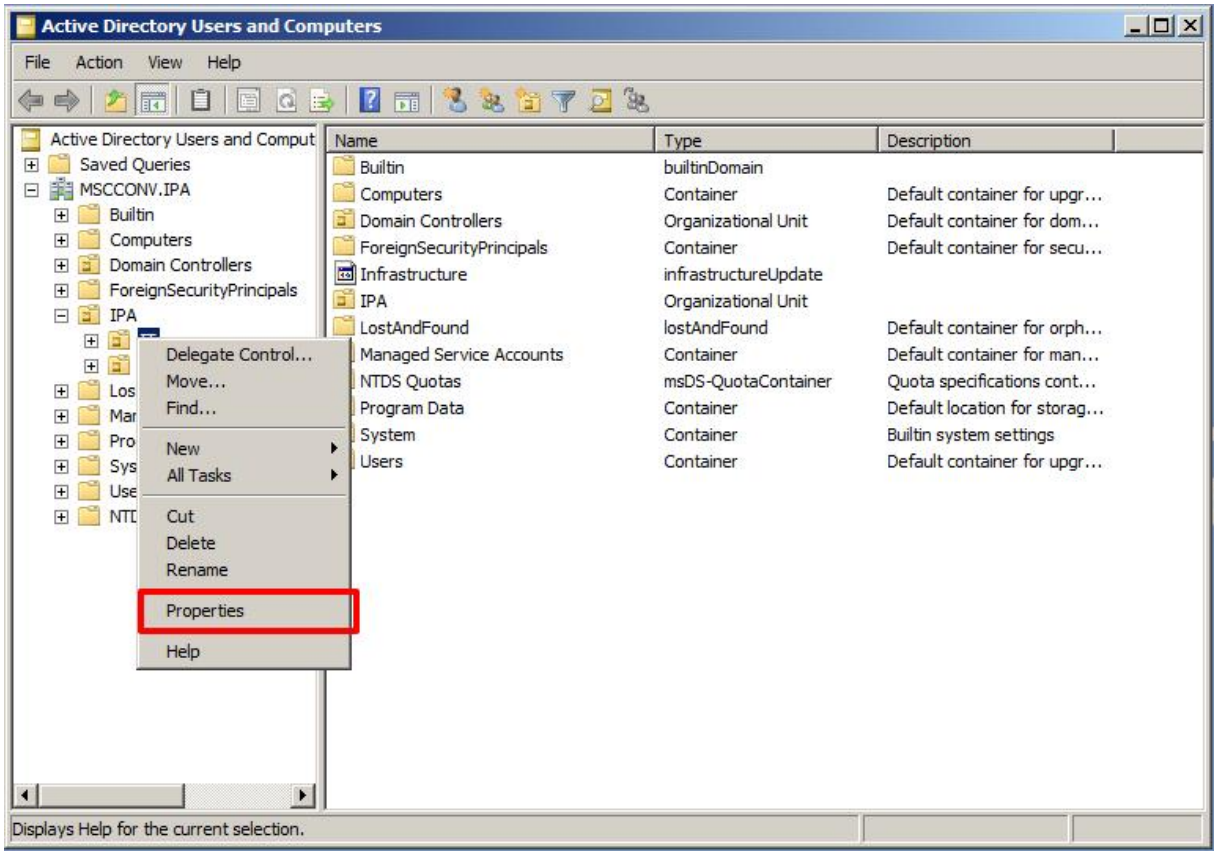
In the search results we can see that the IT OU is currently available to a user in the Marketing OU.



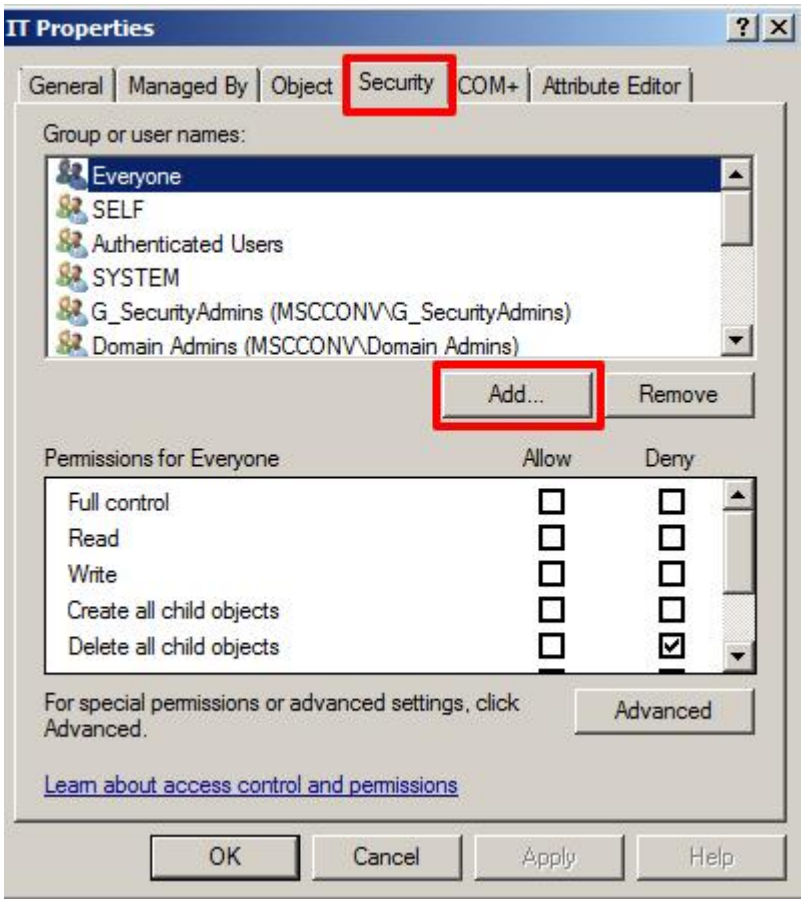
In order to hide an OU from a user or group, we open AD UC, click View and click Advanced Features to enable them.



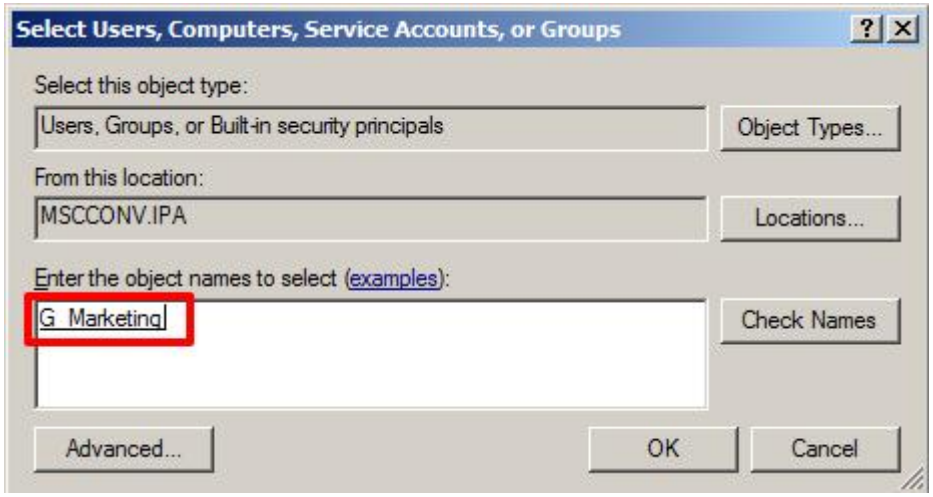
We then right click on the IT OU and click Properties.



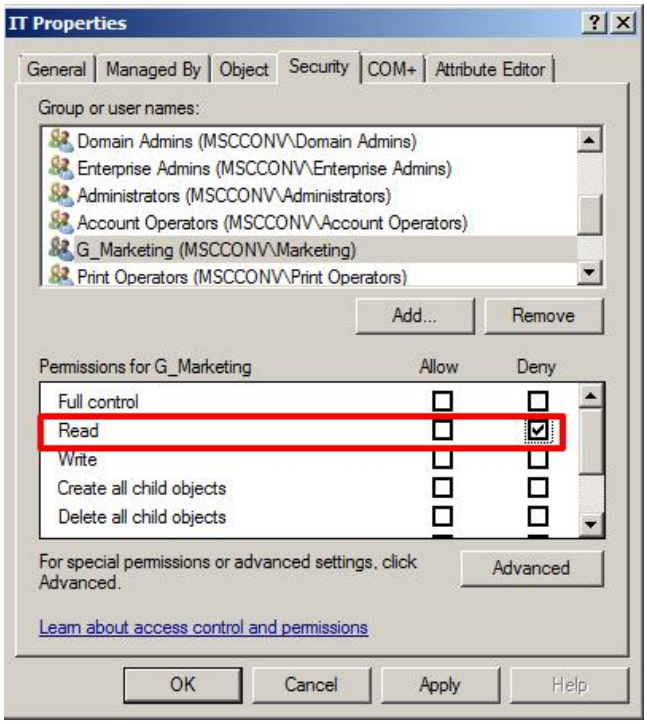
From the Security tab we click Add to add a user or group.



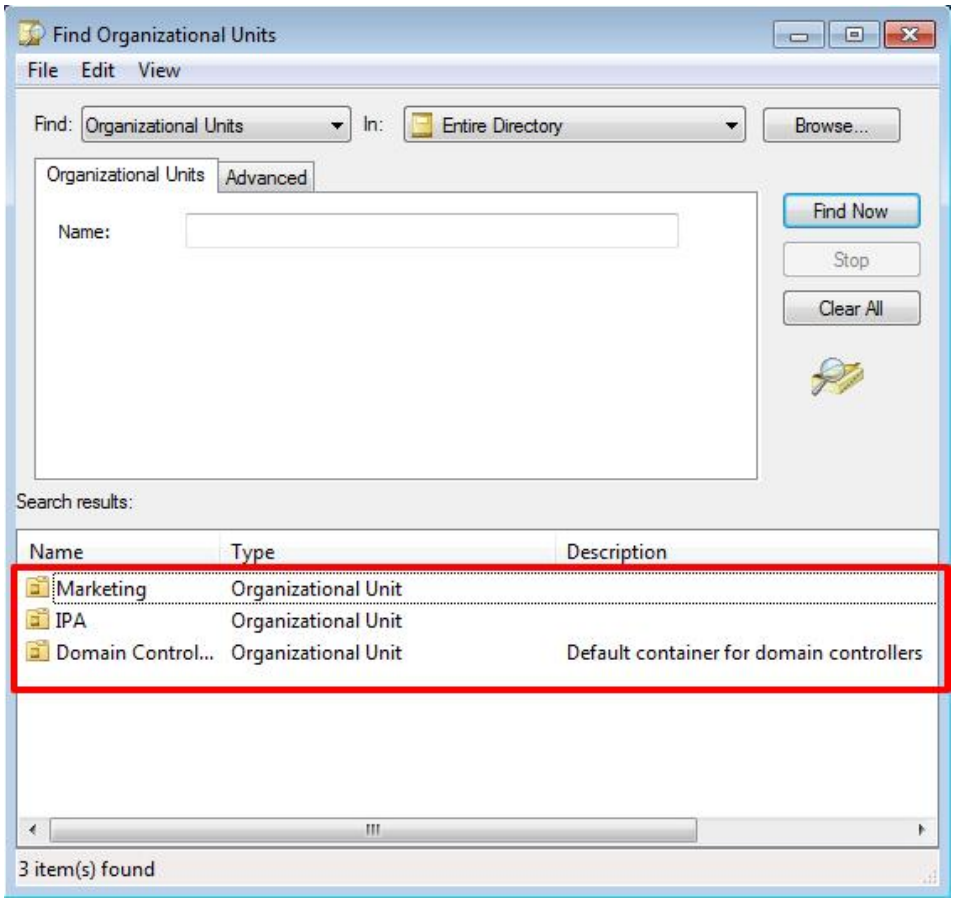
As described before we can retrieve the group we wish to use, in this case the G_Marketing group, that contains the users who reside in the Marketing OU.



We can then click on the G_marketing group and click the Deny checkbox under Read permissions, which will deny Read access to the IT OU for those users in the G_Marketing group.



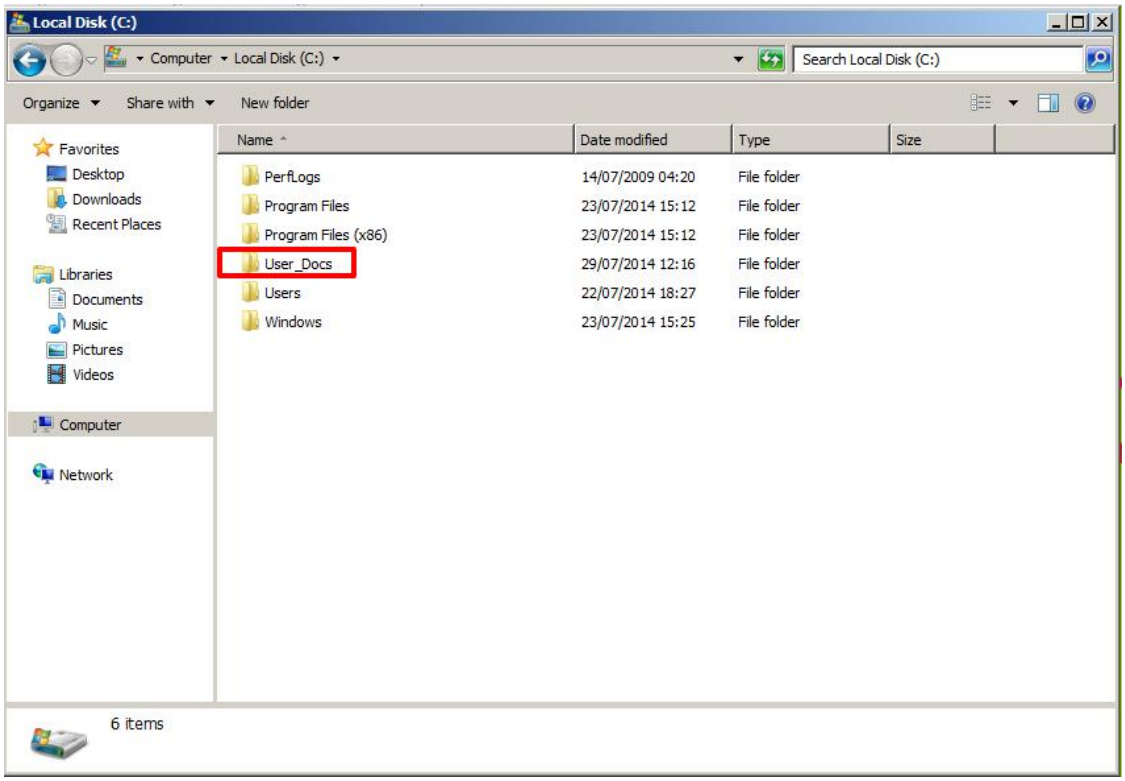
We can then repeat the procedure above, and we see that the IT OU is no longer visible to user6, who is part of the Marketing OU.



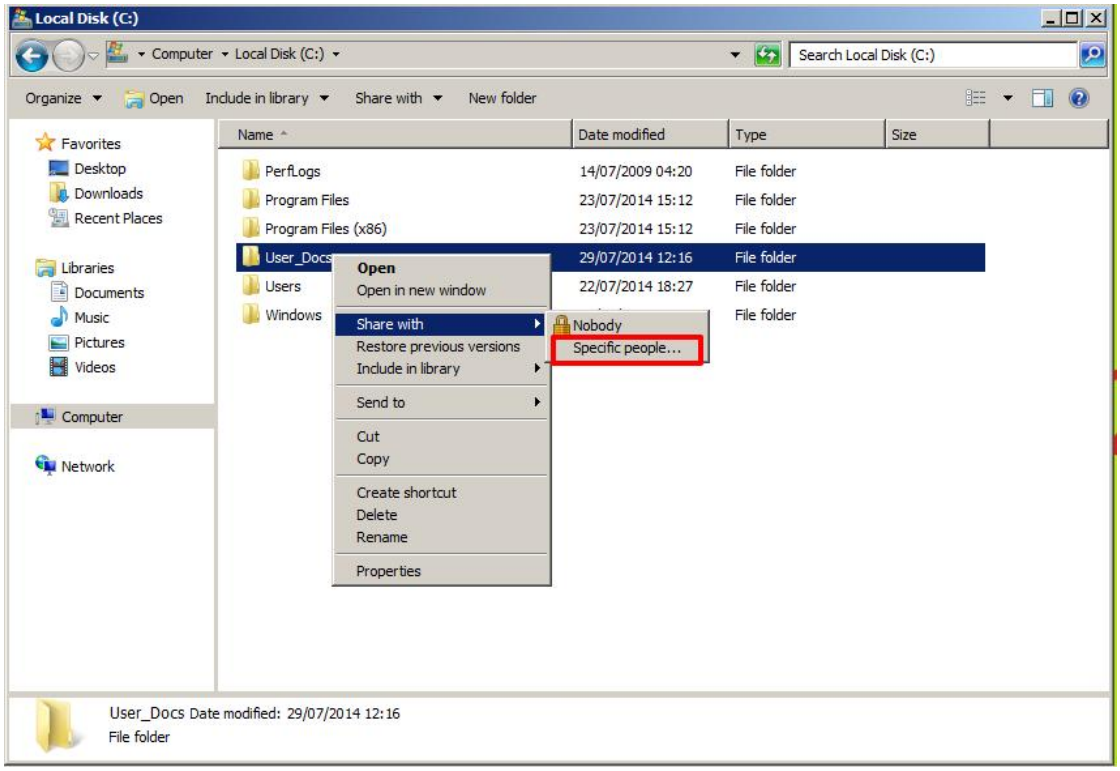
8.2.3 Subtask 3 - Folder Redirection Group Policy Object (GPO)

8.2.3.1 Step 1 - Create Shared Folder

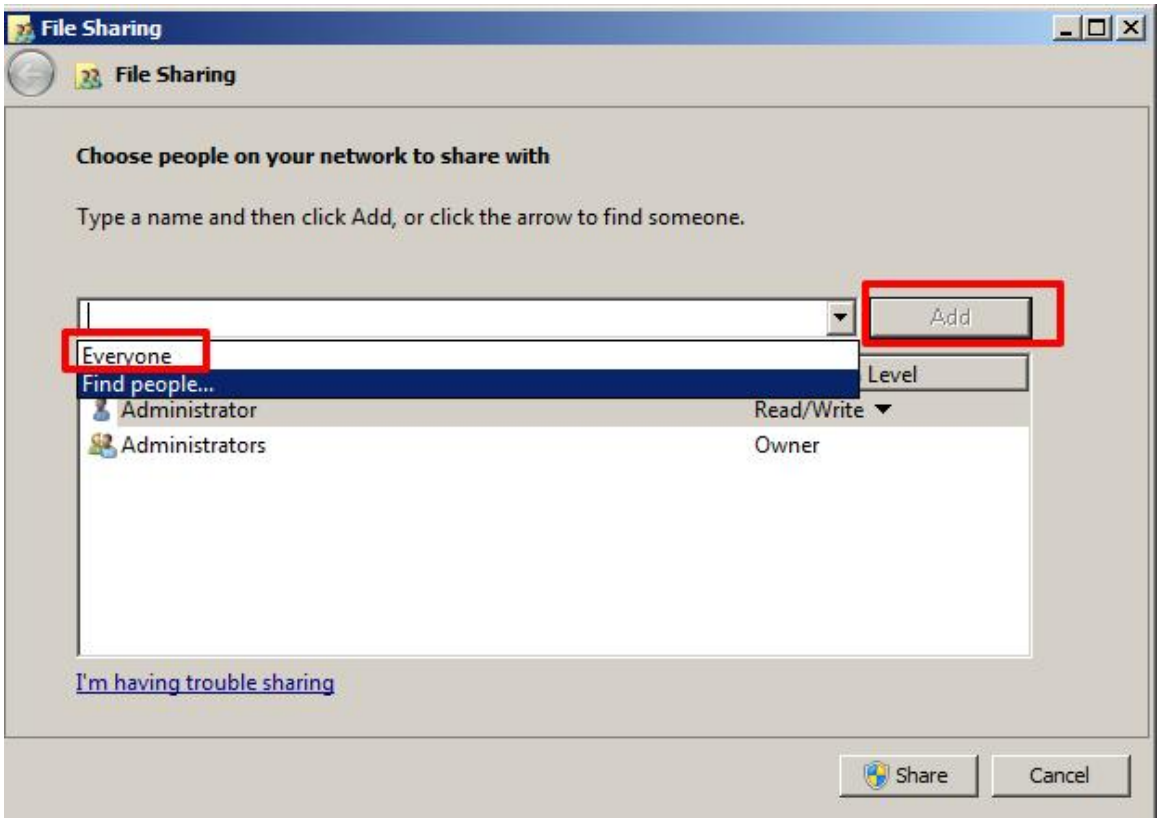
Our first step is to create a folder called User_Docs on the C drive of the Server2 computer and share it out to the network. We click Start, Computer and click on the Local Disk (C) icon. We right click on whitespace and select New, Folder. We then name the folder User_Docs.



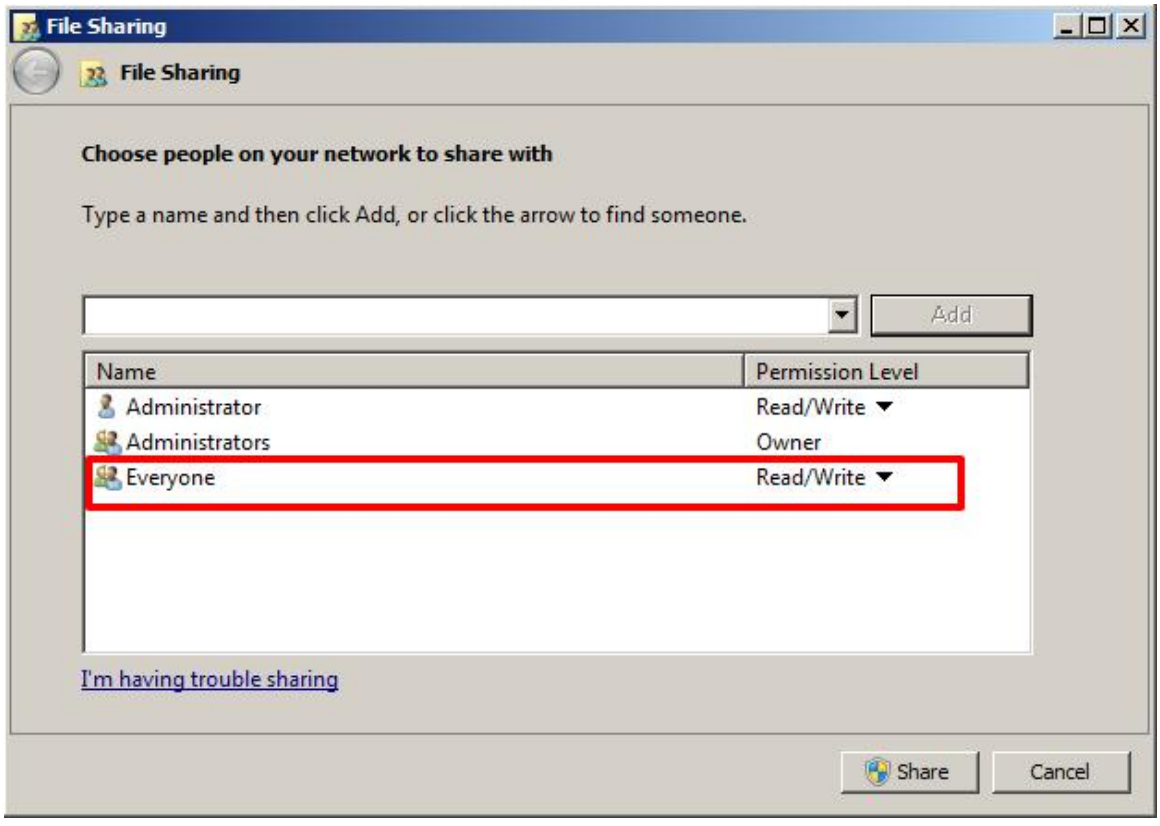
We then share this folder out to the network by right clicking on it and selecting Share with, specific people



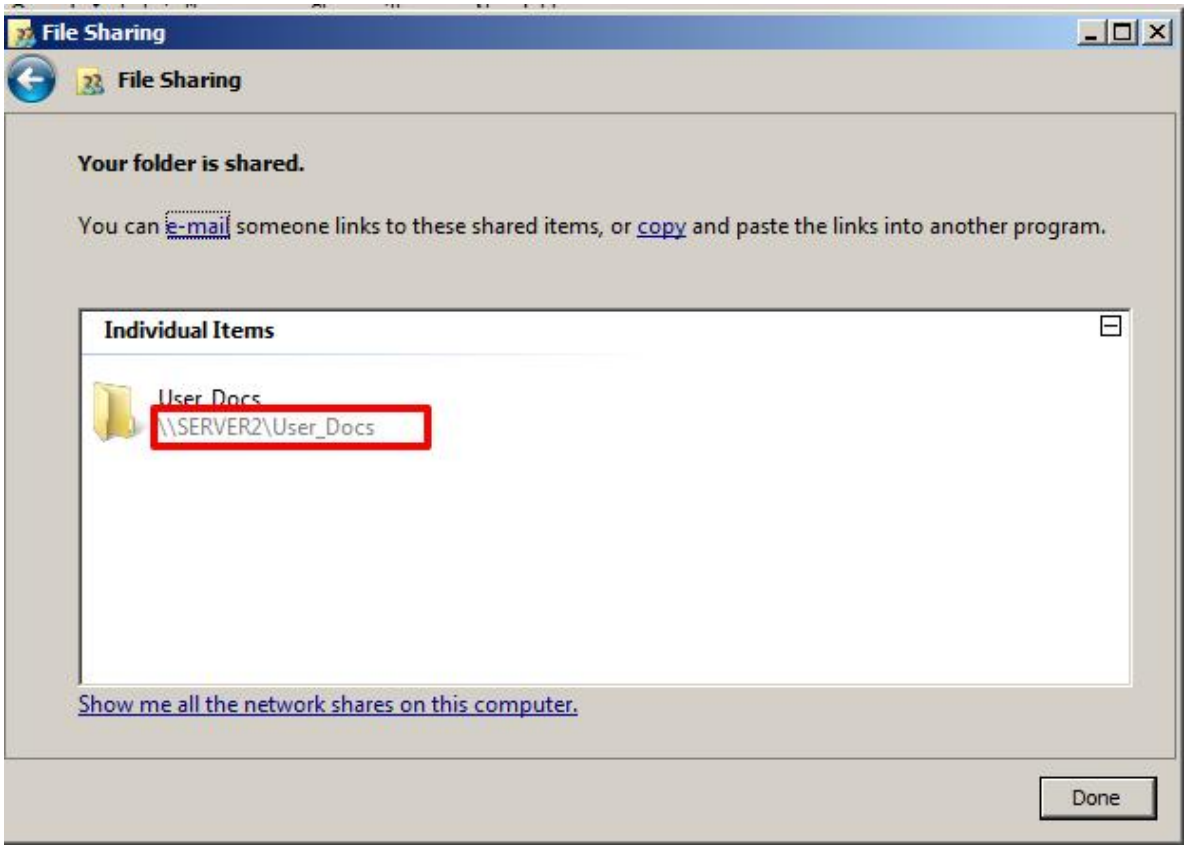
We then type Everyone into the name pane and click Add.



We can then select Everyone, and select Read/Write from the Permission Level dropdown menu, and click Share.

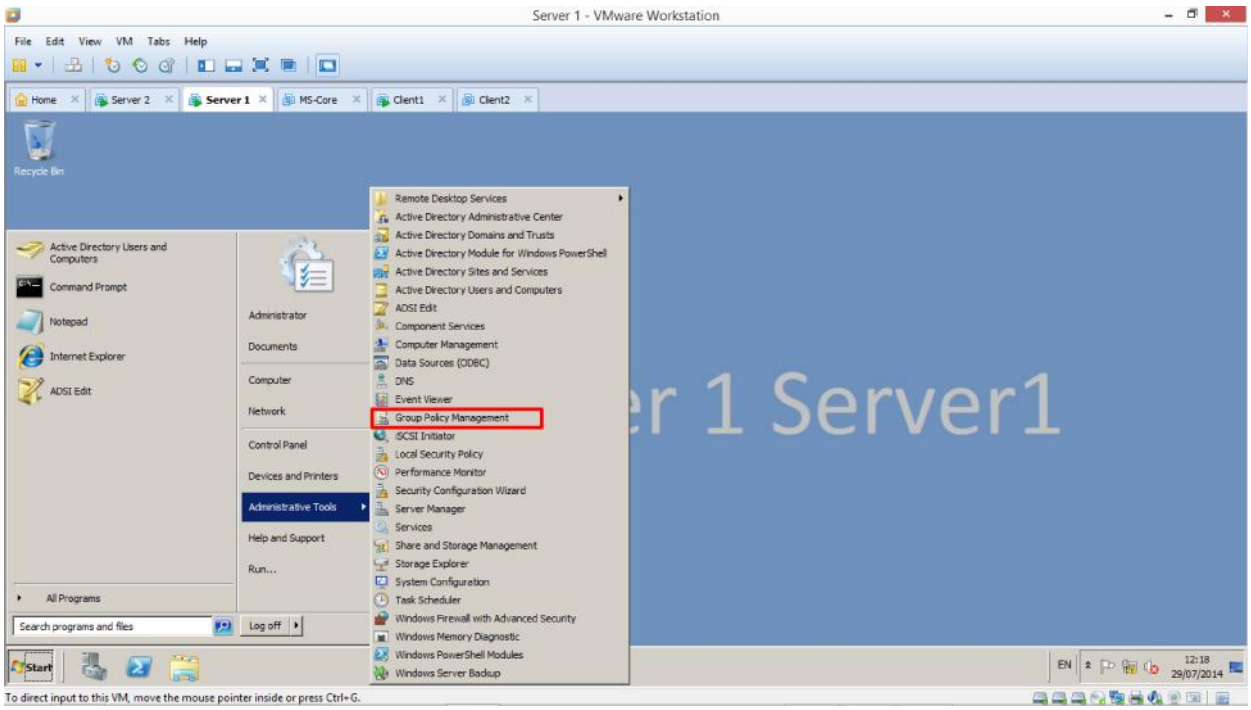


We then receive a notification that the folder has been shared, giving the root path to the share.

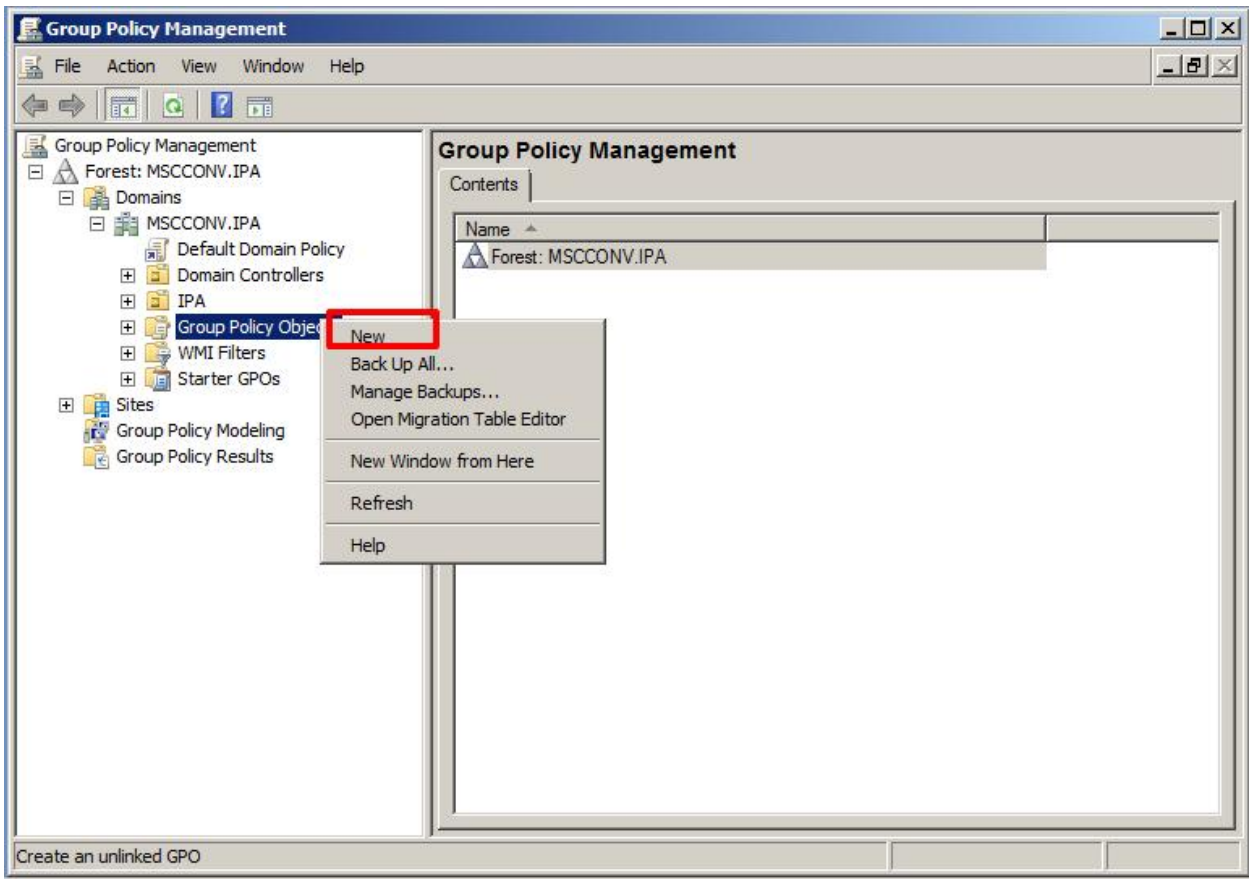

File Sharing
File Sharing
Your folder is shared.
You can e-mail someone links to these shared items, or copy and paste the links into another program.
Individual Items
User_Docs
\\SERVER2\User_Docs
Show me all the network shares on this computer.
Done

8.2.3.2 Step 2 - Create GPO Linked to IPA OU and Filtered to Client1 Machine

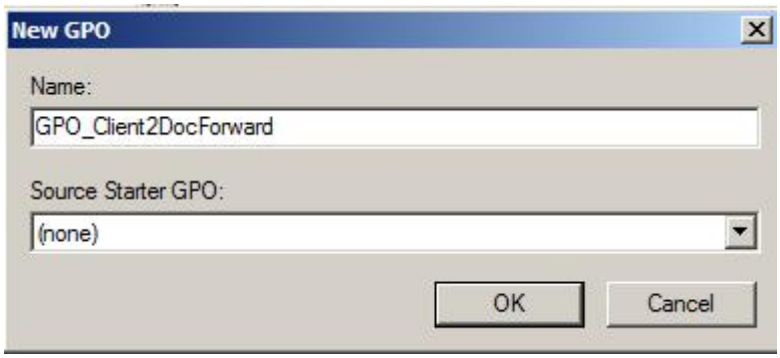
To create a GPO we click Start, Administrative Tasks, Group Policy Management.



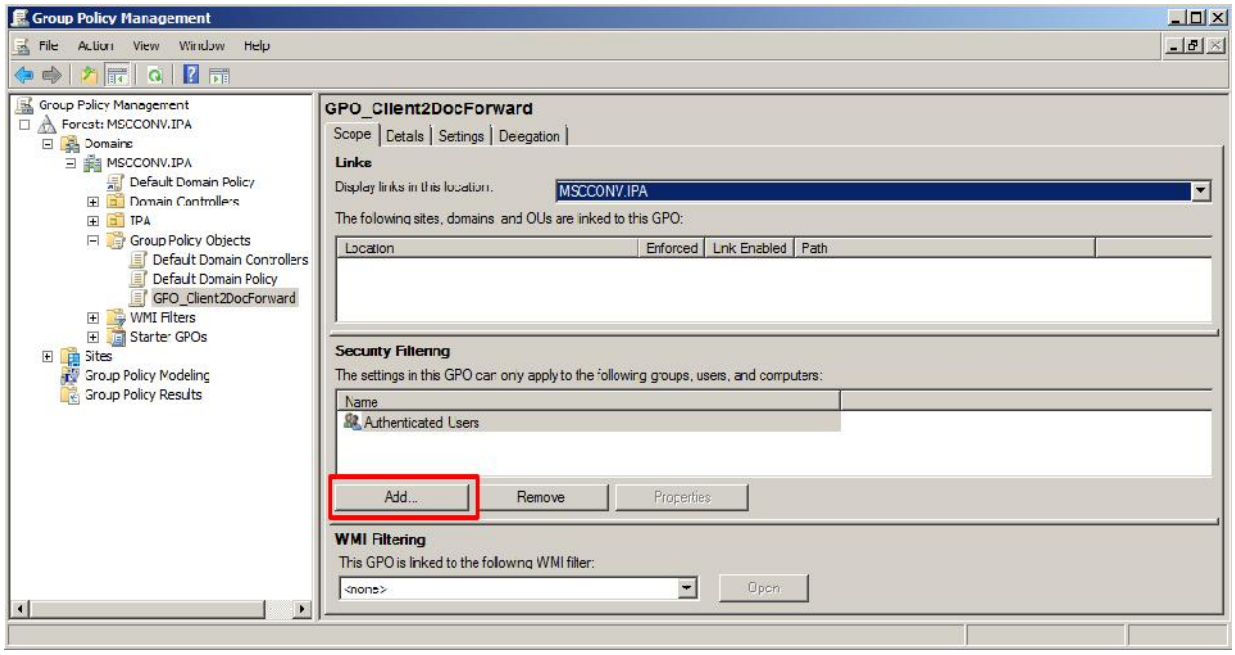
In the Group Policy Management (GPM) snap-in, we expand the MSCCONV.IPA forest, Domains and then the MSCCONV.IPA domain. We then right click on the Group Policy Objects folder and click New.



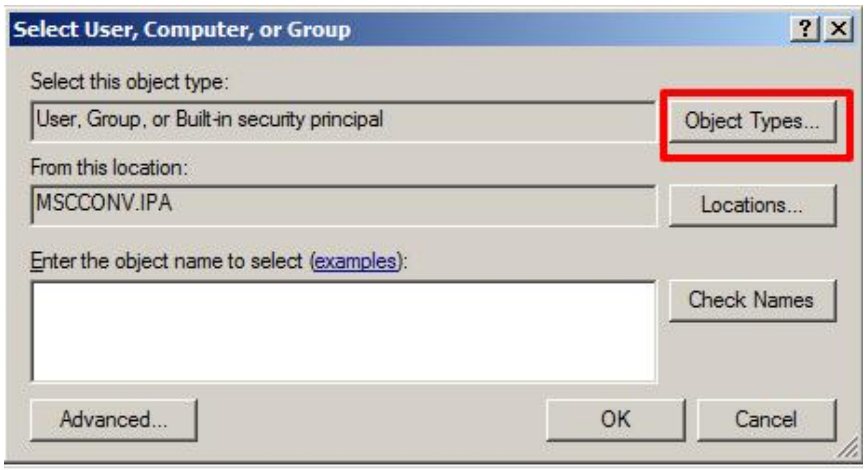
The first resultant window allows us to enter the name of the GPO, we name it GPO_Client1DocForward and leave the Source Starter GPO at none.



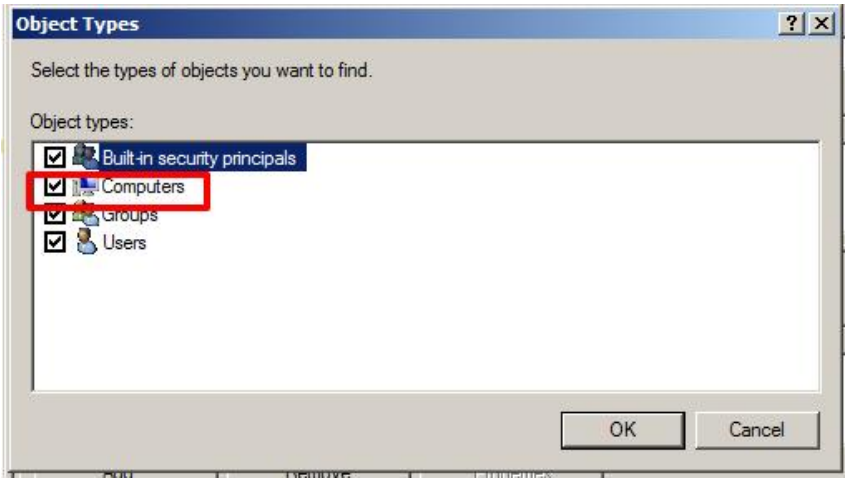
Our next step is to filter the GPO to apply to the Client1 machine. We click on the GPO_Client1DocForward GPO and in the Security Filtering section we click Add.



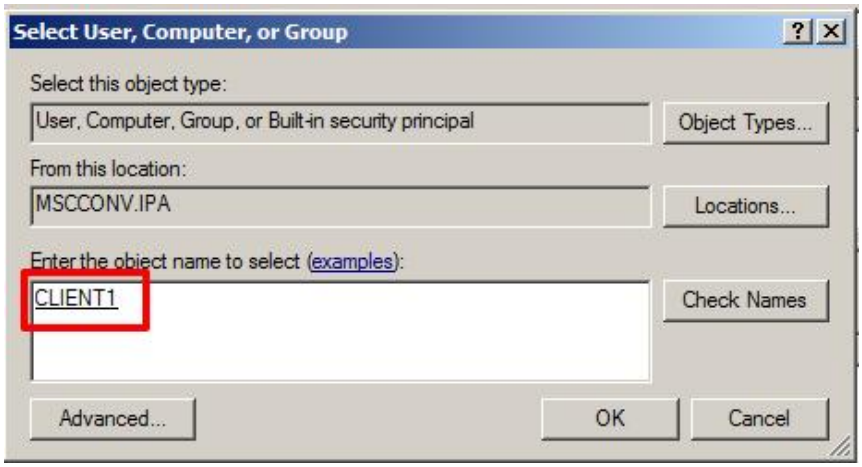
We click Object Types to add Computer object types to the possible object types for filtering.



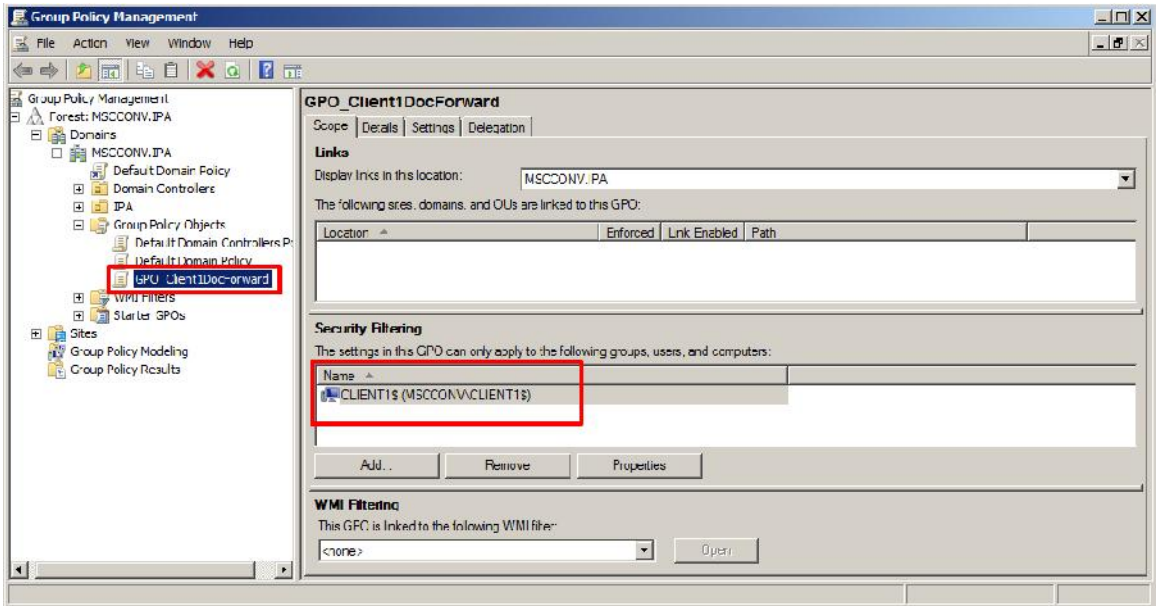
We then tick the Computers checkbox and click OK.



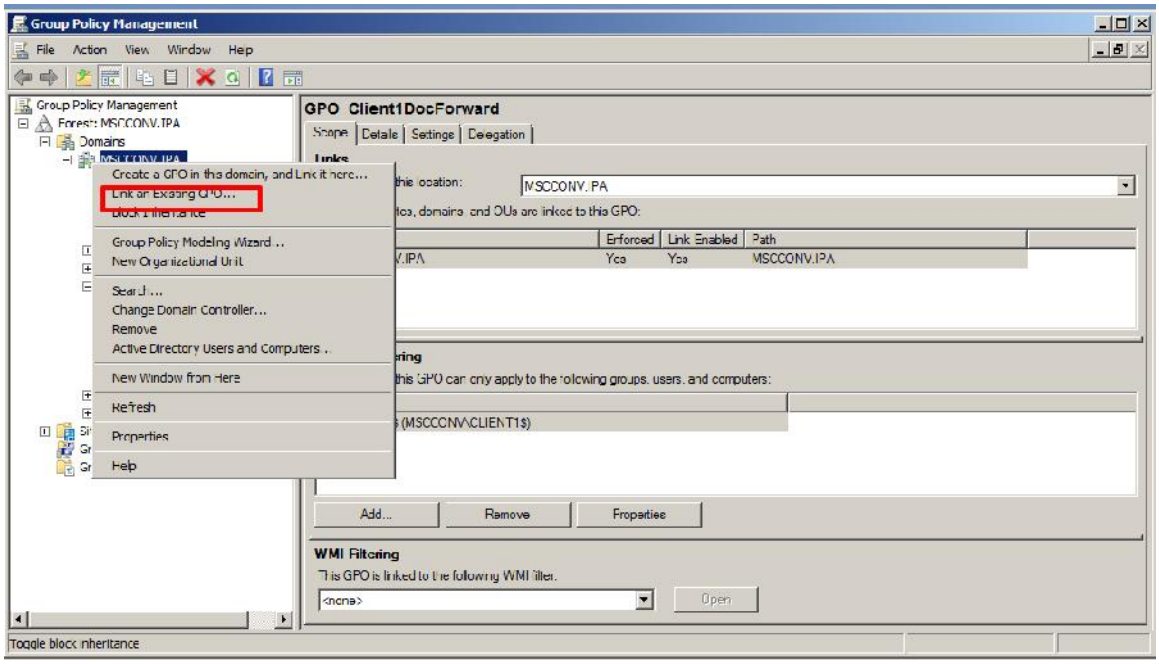
We can then enter Client1 and click Check Names, and then select Client1 from the returned computers, it will be added to the object name to select pane and we click OK.



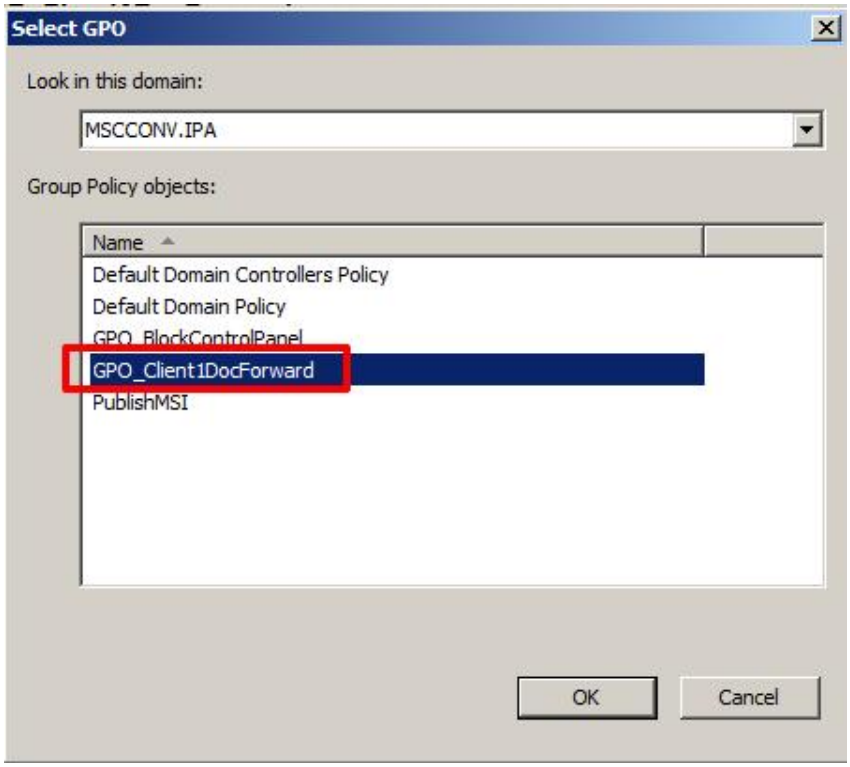
We can then see that the GPO has been filtered such that it is only applied to the Client1 computer.



We then link the newly created GPO to the IPA OU by right-clicking on the IPA OU, and selecting Link An Existing GPO.

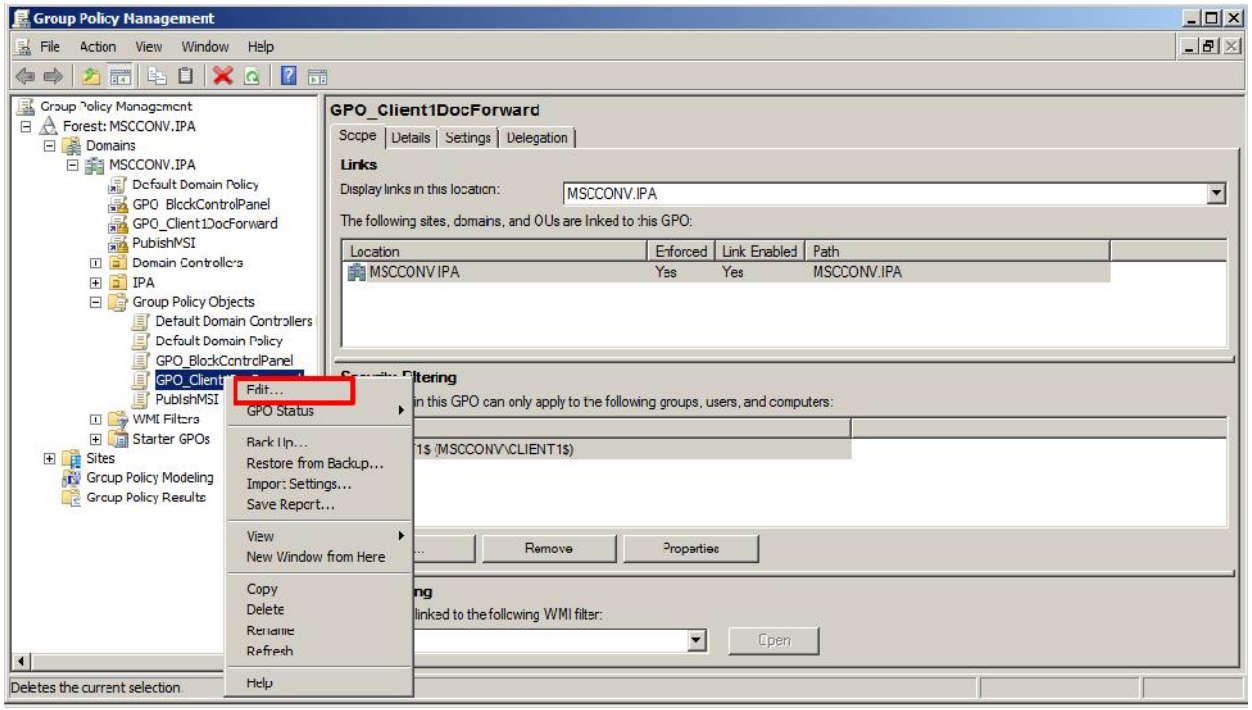


We are then given the list of currently existing GPOs, and we select the GPO_Client1DocForward GPO that we have created.

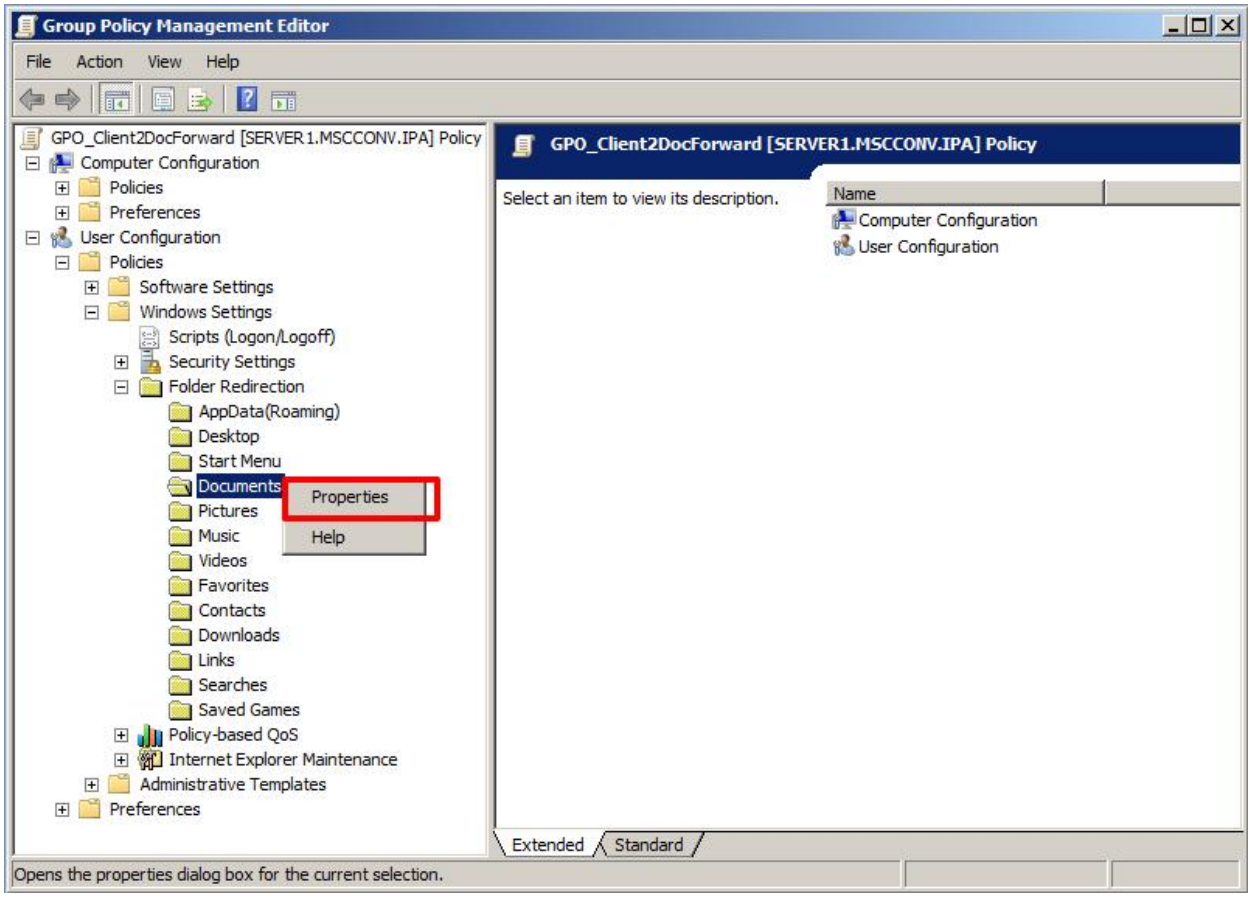


8.2.3.3 Step 3 - Define Group Policy Settings

From the GPM snap-in we right click on the GPO_Client1DocForward GPO and click Edit.

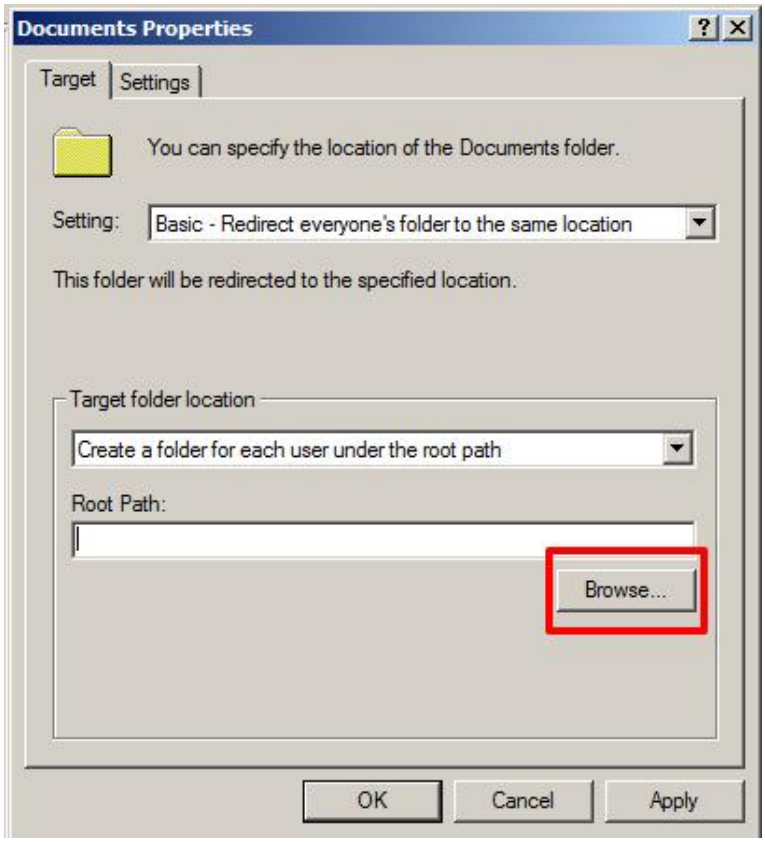


Under User Configuration we expand the Policies tree to, Windows, Folder Redirection, Documents, which we right-click and select Properties.

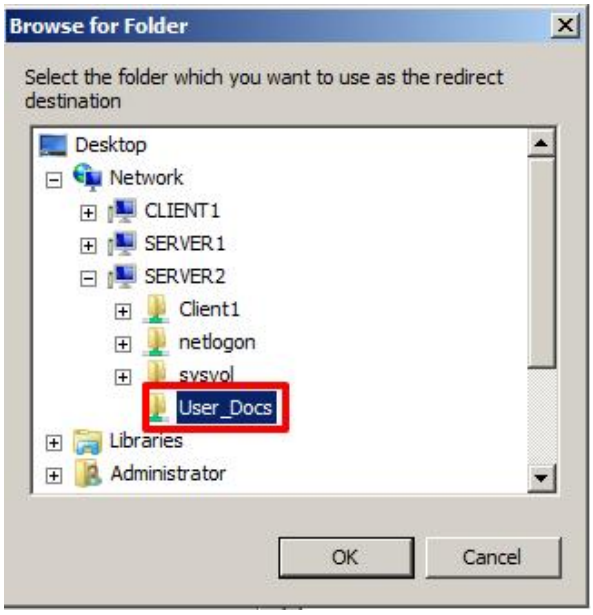


We then define the settings for the folder redirection of the Documents folder. Under the Target Tab, in the Settings dropdown menu, we select Basic – Redirect everyone's folders to the same location. In the Root Path box, we click Browse.

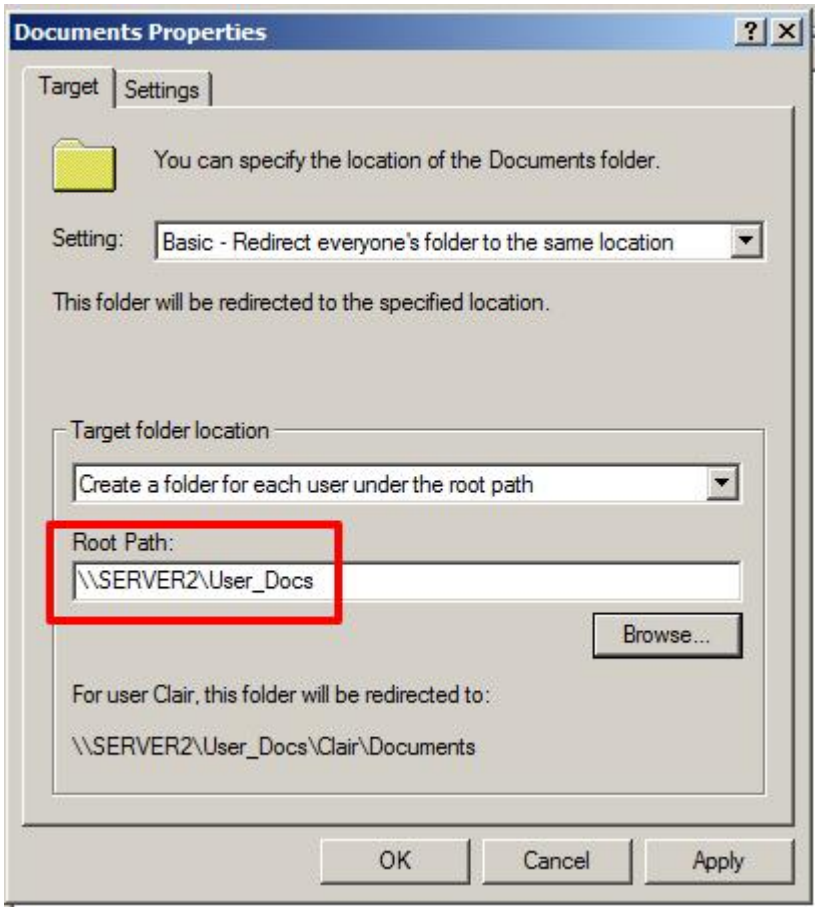
For Target folder location, we select Create a folder for each user under the root path. This means that a folder will be created for each individual computer/user to which this GPO is applied.



We then navigate to the User_Docs folder that has been shared on the network, select it, and click OK.



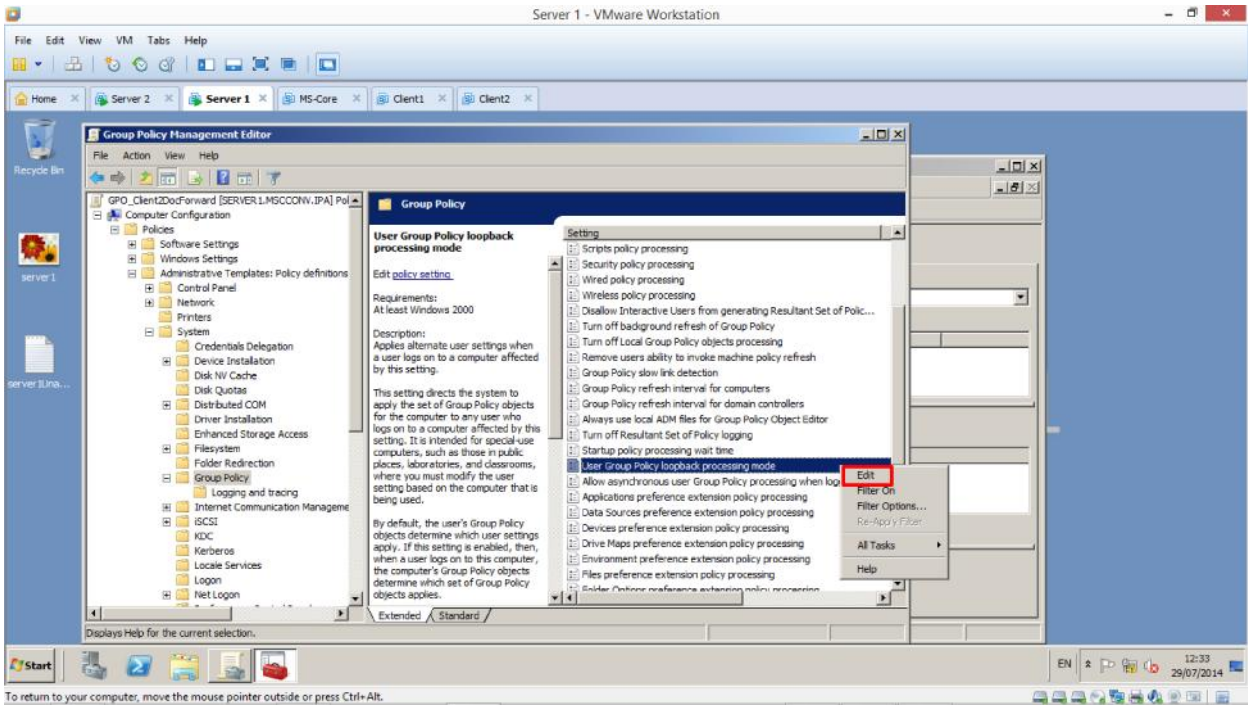
The root path of the User_Docs folder is then added and we click Apply, and OK.



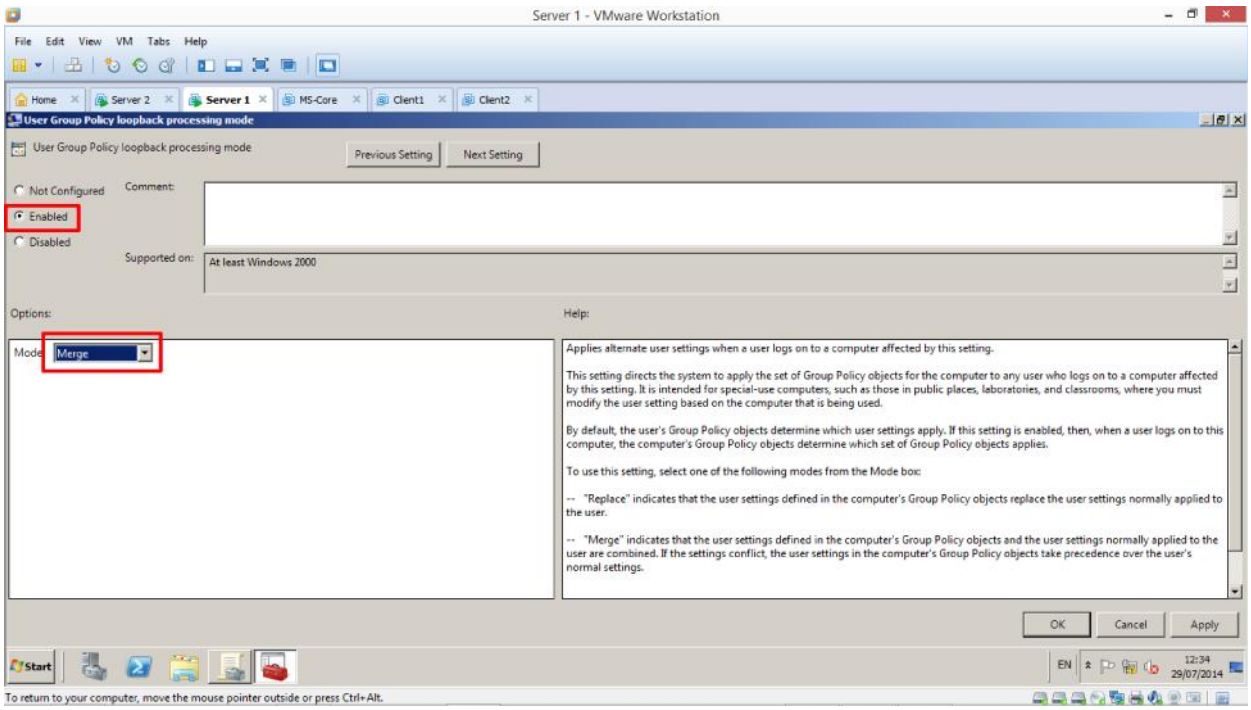
We can click Yes to the warning message.

Warning
If you have any folder's setting that is not applied to Windows 2000, Windows 2000 Server, Windows XP and Windows Server 2003 OS's, you will no longer be able to change any folder redirection settings in this GPO from those OS's.
Do you want to continue?
Yes
No

To ensure that the GPO will apply to a computer and not just a user, we modify a second group Computer Configuration policy within the GPO. This policy is located at Computer Confifuration, Administrative Template Policies, System, Group Policy. In this location, we scroll down to the User Group Policy loopback processing mode policy and highlight it. We right click on it and click Edit.



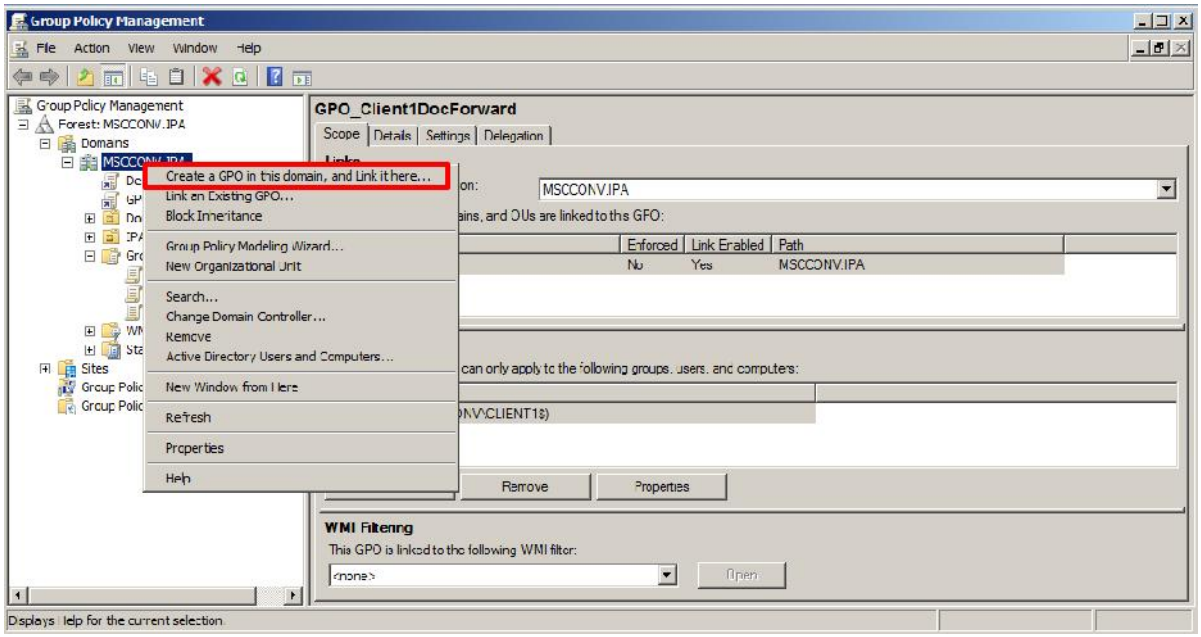
We then select Enabled and change the option to Merge. Then click OK.



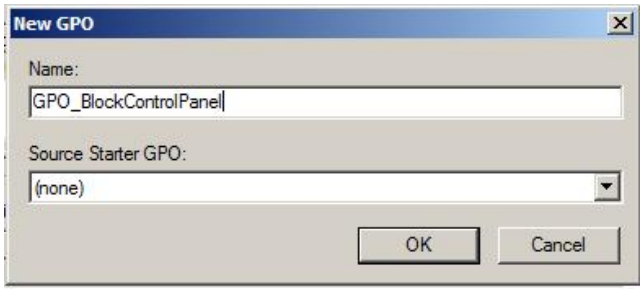
The folder redirection comes into effect the next time the computer is logged into the domain.

8.2.4 Subtask 4 - Prohibit Control Panel Access Group Policy Object

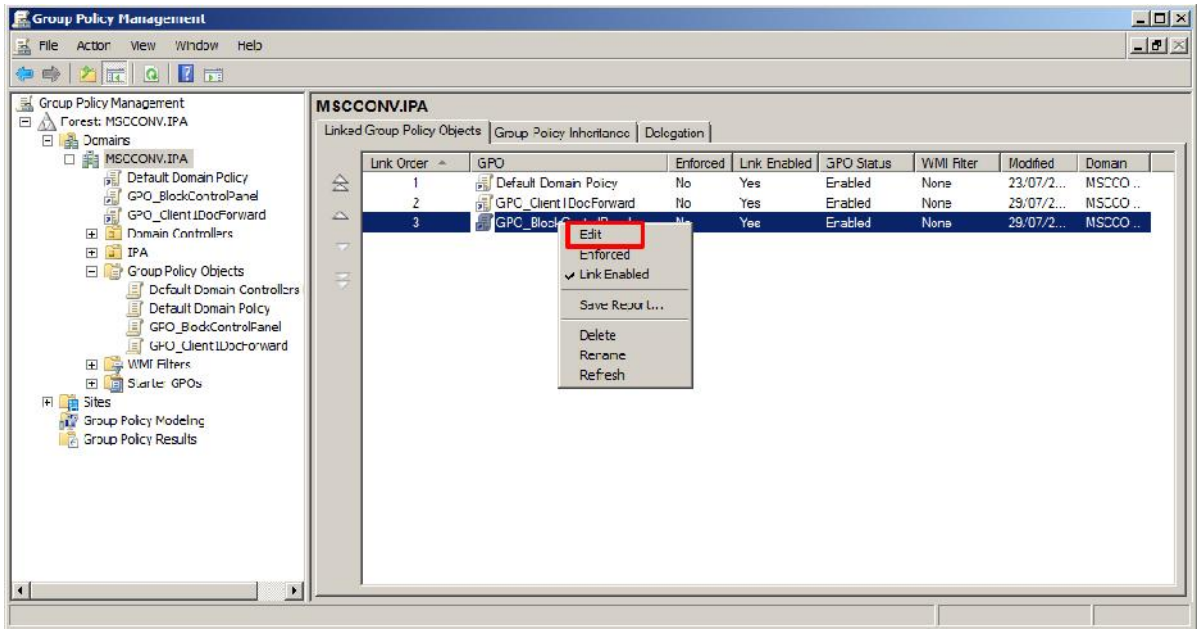
Our first step is to create a new GPO. From the GPM snap-in we right click on our domain and select Create a GPO in this domain and link it here.



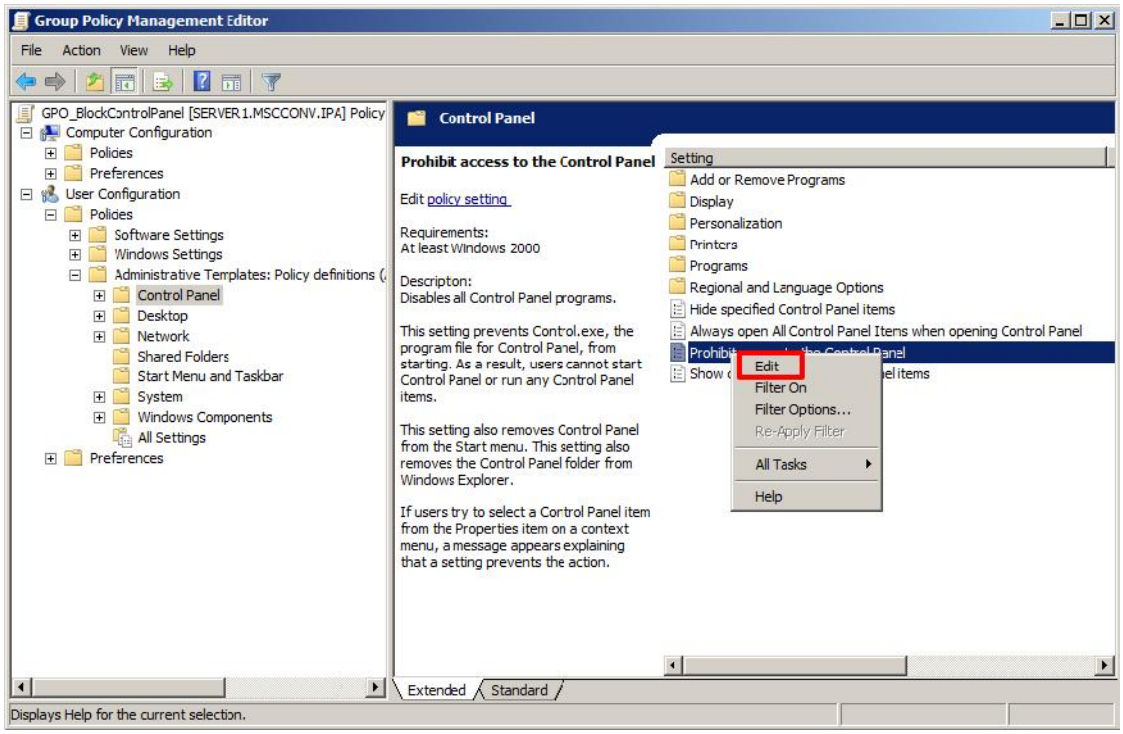
We then name the GPO as GPO_BlockControlPanel.



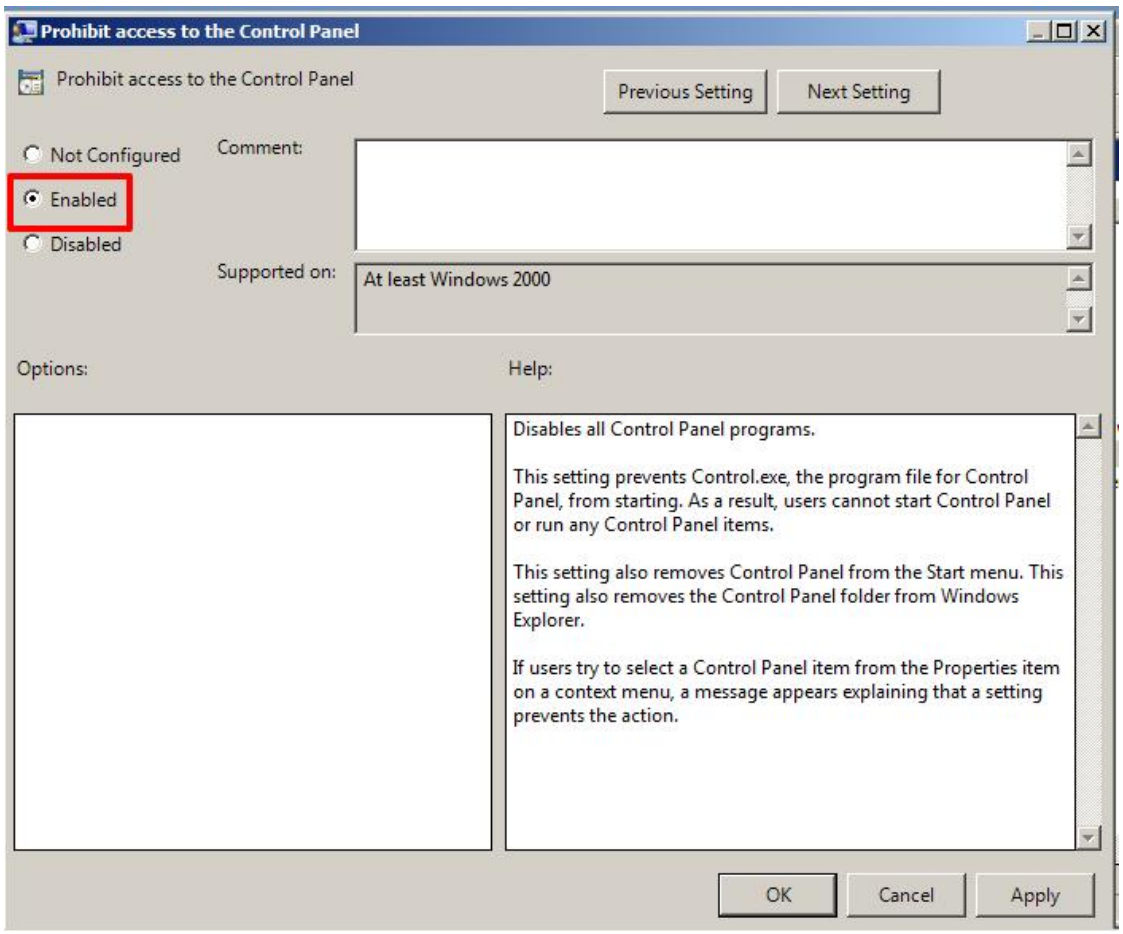
We then right click on the new GPO and select Edit to open the GPM Editor.



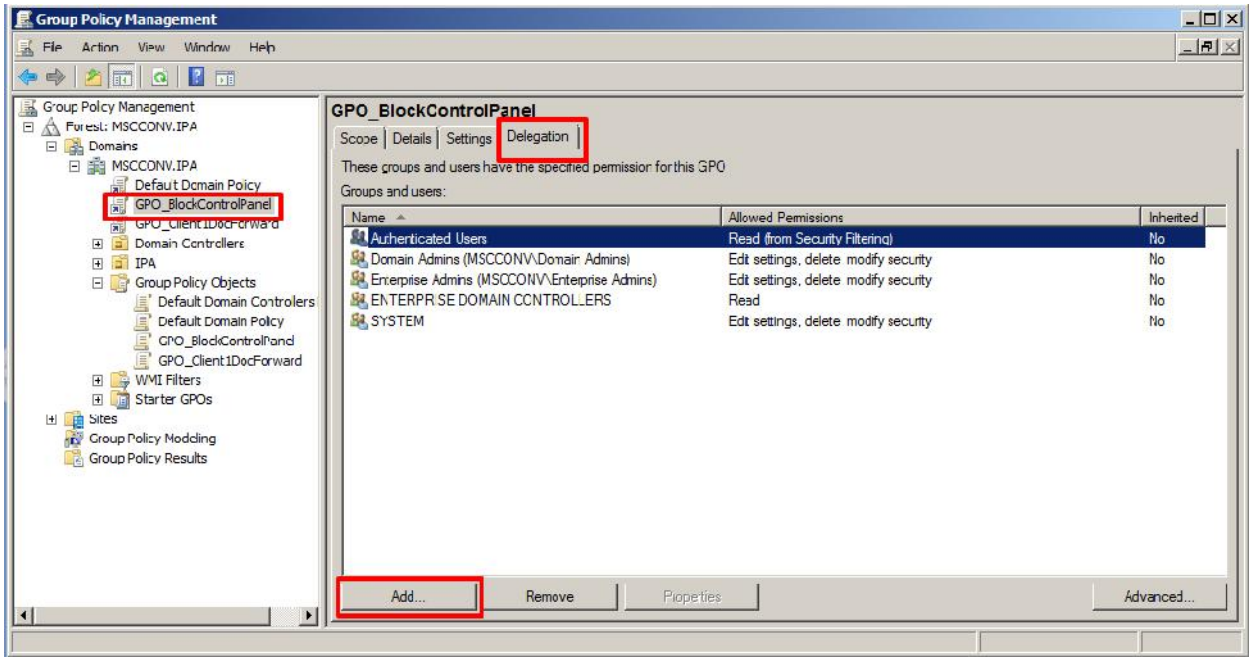
We then expand down to User Configuration, Policies, Administrative Templates, Control Panel. We then right-click on the Prohibit access to the control panel setting and click Edit.



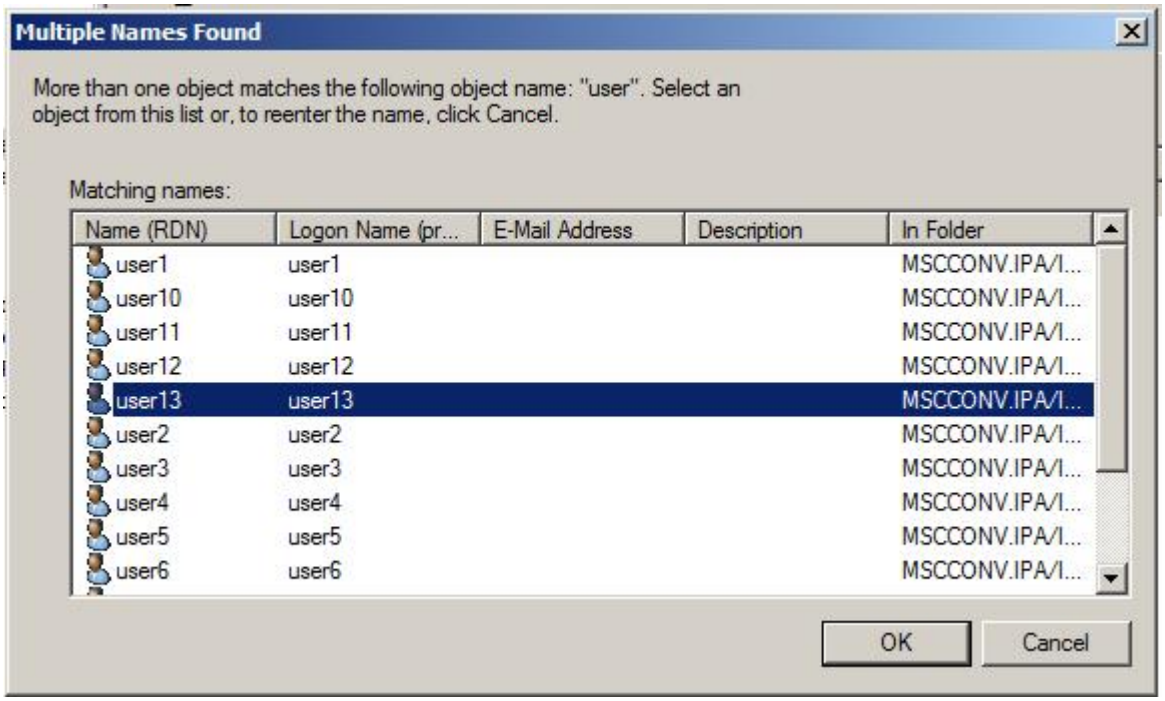
We then click the Enabled radio button and click Apply, and OK.


Prohibit access to the Control Panel
Prohibit access to the Control Panel
Previous Setting
Next Setting
Not Configured
Enabled
Disabled
Comment:
Supported on:
At least Windows 2000
Options:
Help:
Disables all Control Panel programs.
This setting prevents Control.exe, the program file for Control Panel, from starting. As a result, users cannot start Control Panel or run any Control Panel items.
This setting also removes Control Panel from the Start menu. This setting also removes the Control Panel folder from Windows Explorer.
If users try to select a Control Panel item from the Properties item on a context menu, a message appears explaining that a setting prevents the action.
OK
Cancel
Apply

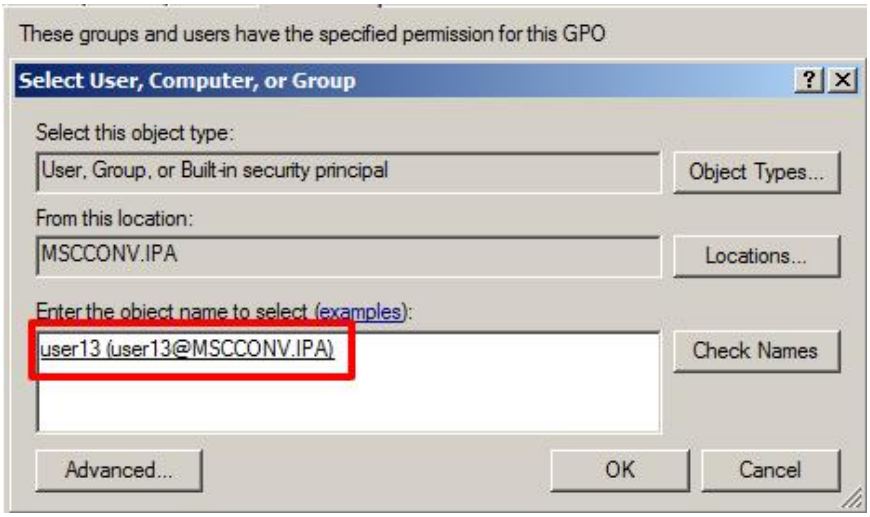
To restrict a group and exclude the GPO from affecting one user from that group, we will modify the Delegation settings within the Group Policy Management snap-in. We click on the GPO, click the Delegation tab, and click Add.



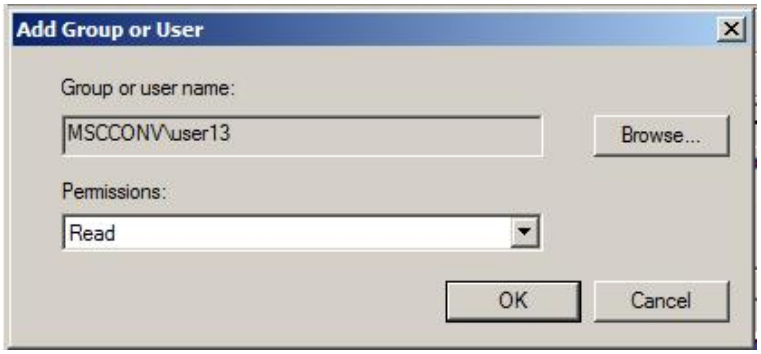
We can type user into the object name to select and click Check Names, and then select the user we wish to exclude from the GPO, we select user13, one of the two users in the Belfast OU, and click OK



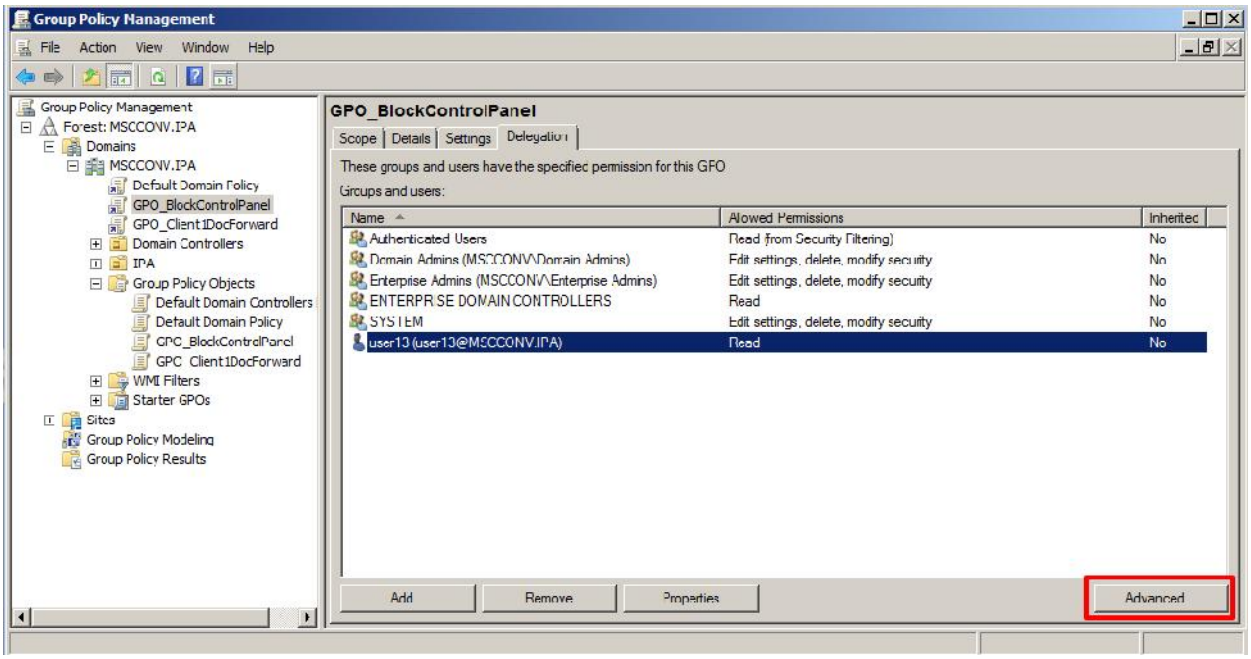
User13 has now been selected.



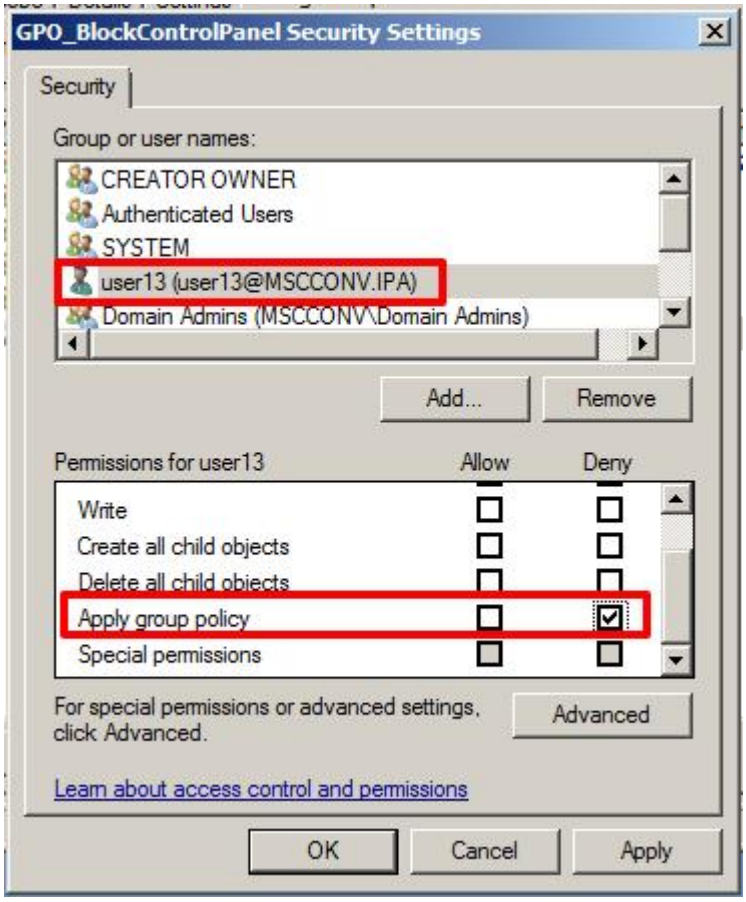
We can then select the permissions we want to grant to this user, and we use the default permission of Read, and click OK.



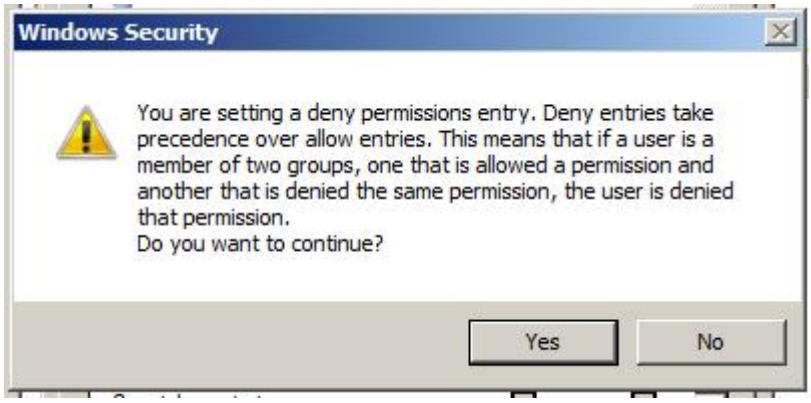
From the GPM snap-in we then select the user we have just added and click Advanced.



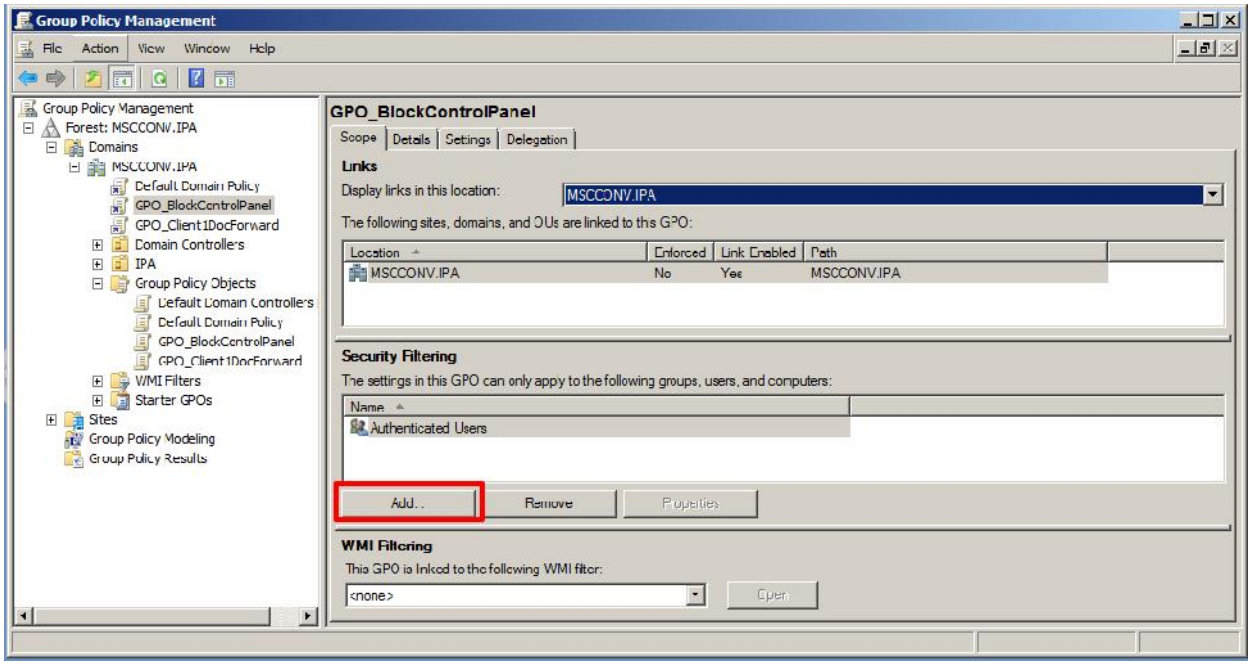
We then reselect user13, and in their permissions, we tick the Deny checkbox for Apply group policy, and click Apply, and OK.



We click Yes at the resultant warning message.

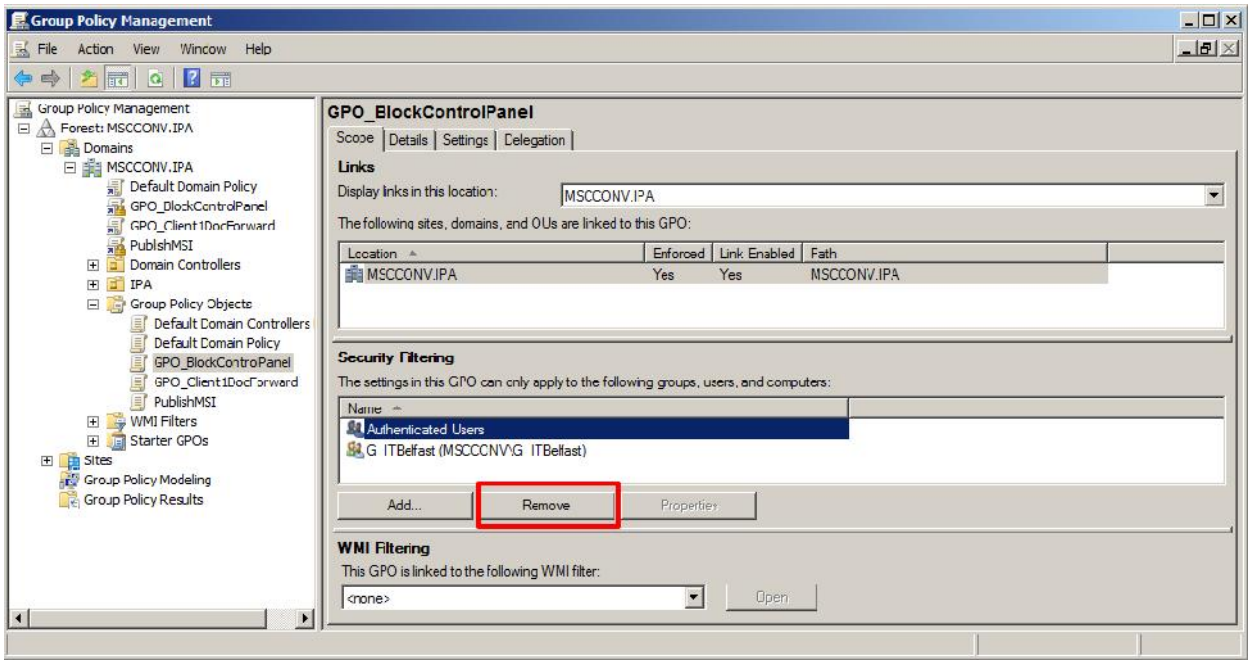

Windows Security
You are setting a deny permissions entry. Deny entries take precedence over allow entries. This means that if a user is a member of two groups, one that is allowed a permission and another that is denied the same permission, the user is denied that permission.
Do you want to continue?
Yes
No

We then select the group to which you want the GPO to apply. From the GPM snap-in we select the Scope tab and select Add under the Security Filtering section.

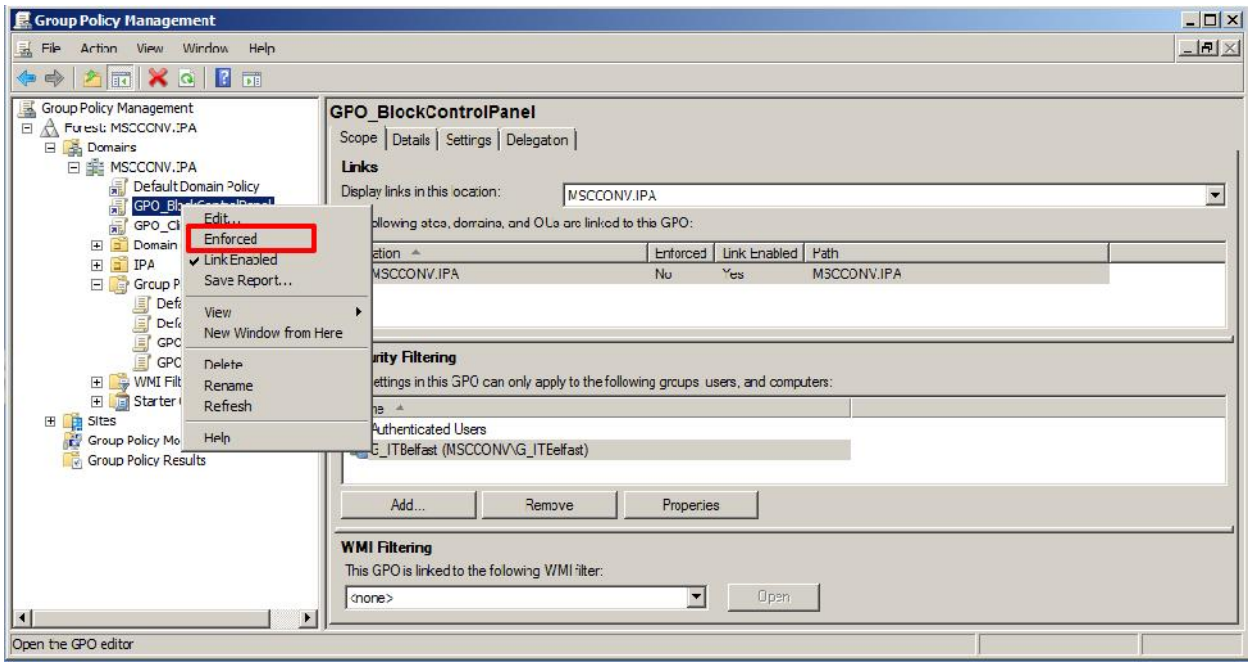


We type the G_ITBelfast group name and click Check Names. The group name appears underlined once it has been found, and we click OK.

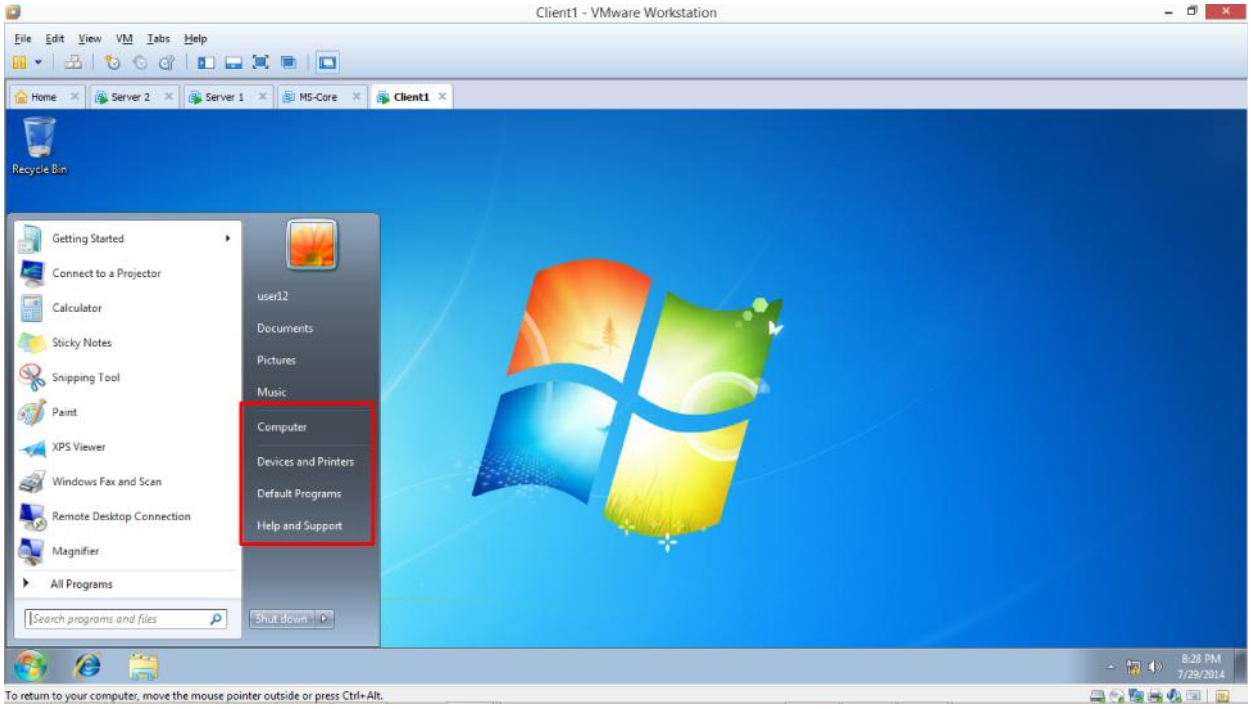
We then select the default Authenticated Users group and click Remove.



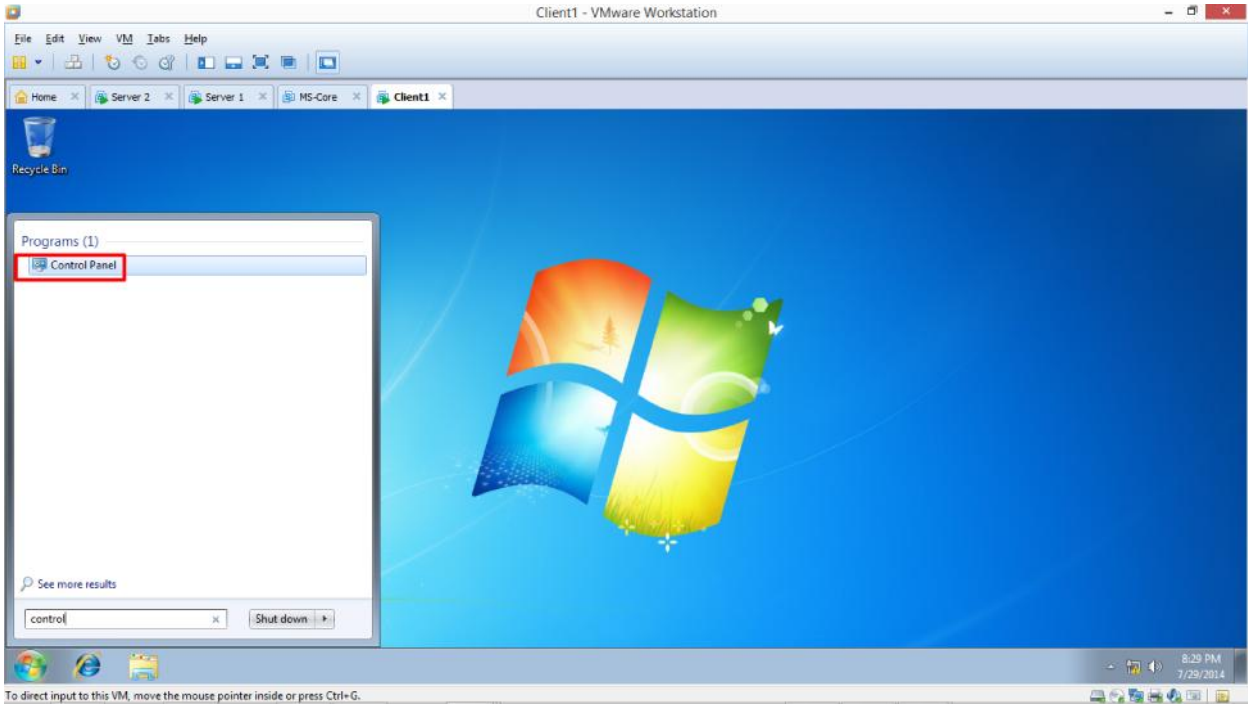
Certain containers may have blocked inheritance and in order for this GPO to affect them as well we enforce the GPO by right-clicking on it and selecting Enforced.



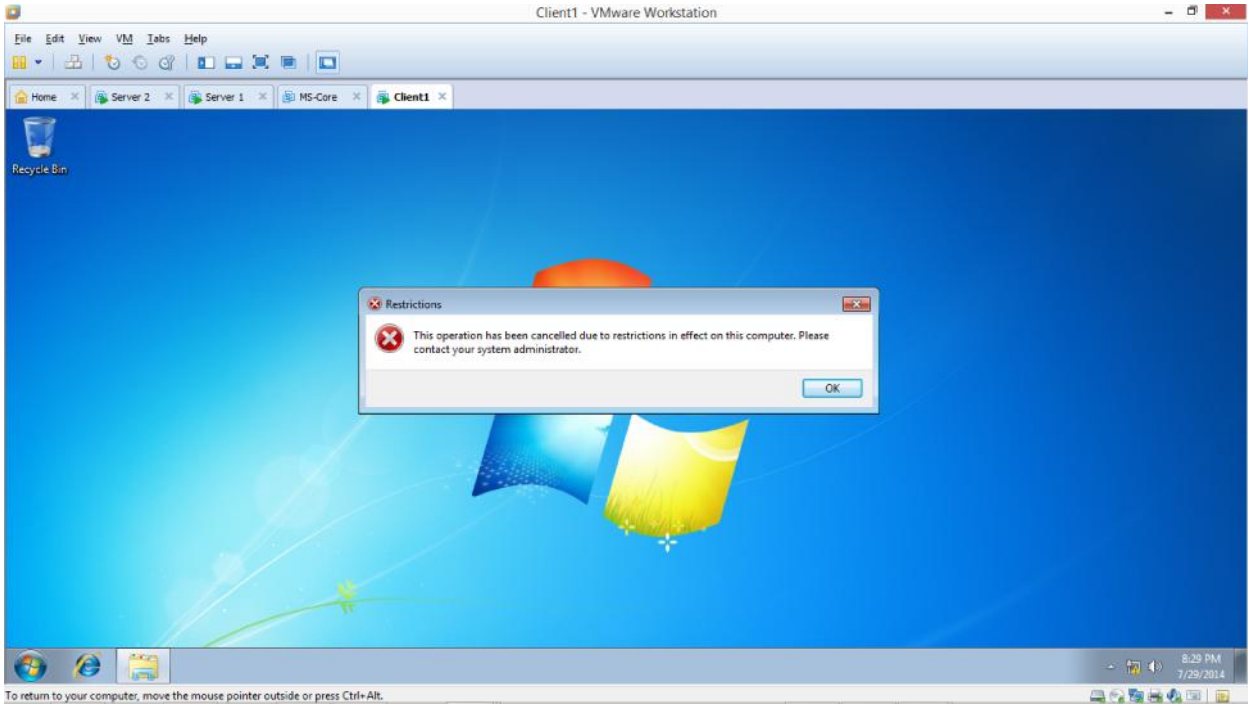
We can then test that the GPO has been applied by logging on to Client1 as user12, one of the users in the Belfast OU. We can see that the Control Panel is not available from the start menu.



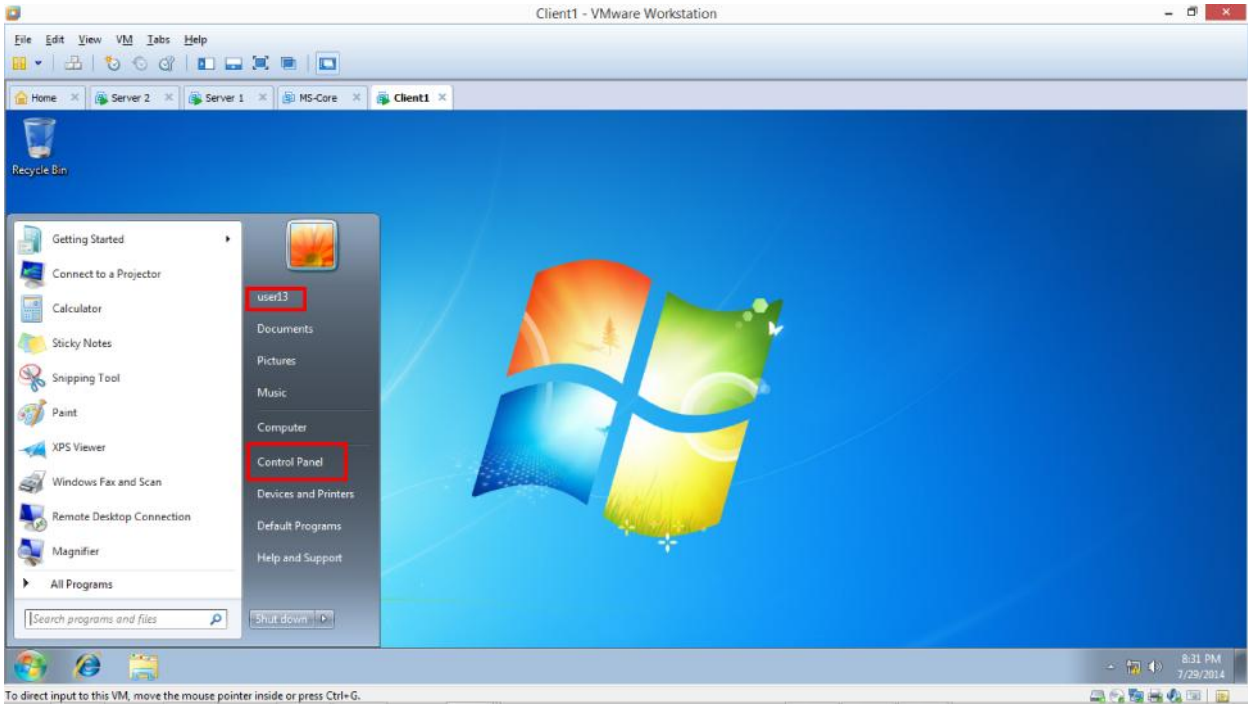
We can then do a search for Control Panel, and click on the Control Panel search result.



A message is then generated advising that the operation has been cancelled due to restrictions in effect on the computer.


Client1 - VMware Workstation
File Edit View VM Tabs Help
Home Server 2 Server 1 MS-Core Client1
Recycle Bin
Restrictions
This operation has been cancelled due to restrictions in effect on this computer. Please contact your system administrator.
OK
8:29 PM
7/29/2014
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

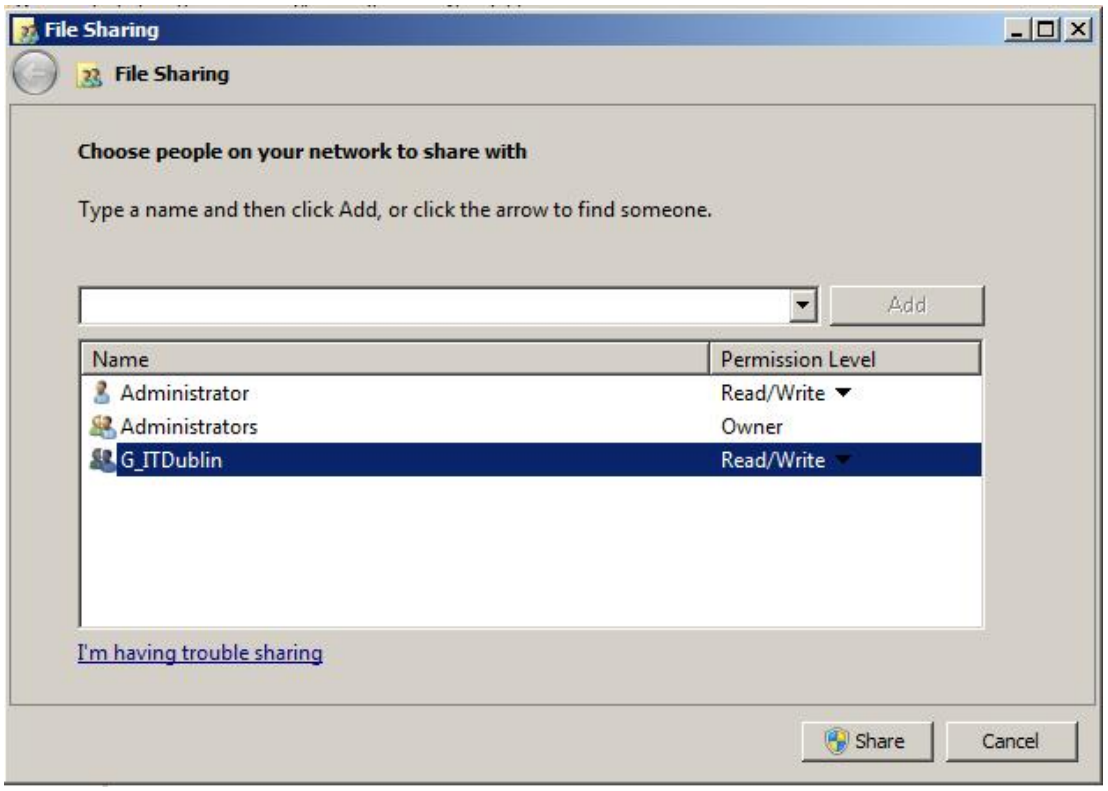
If we log on to client1 as user13, who is a member of the Belfast OU but has been explicitly exempt from the group policy, we see that the control panel is available from the start menu.

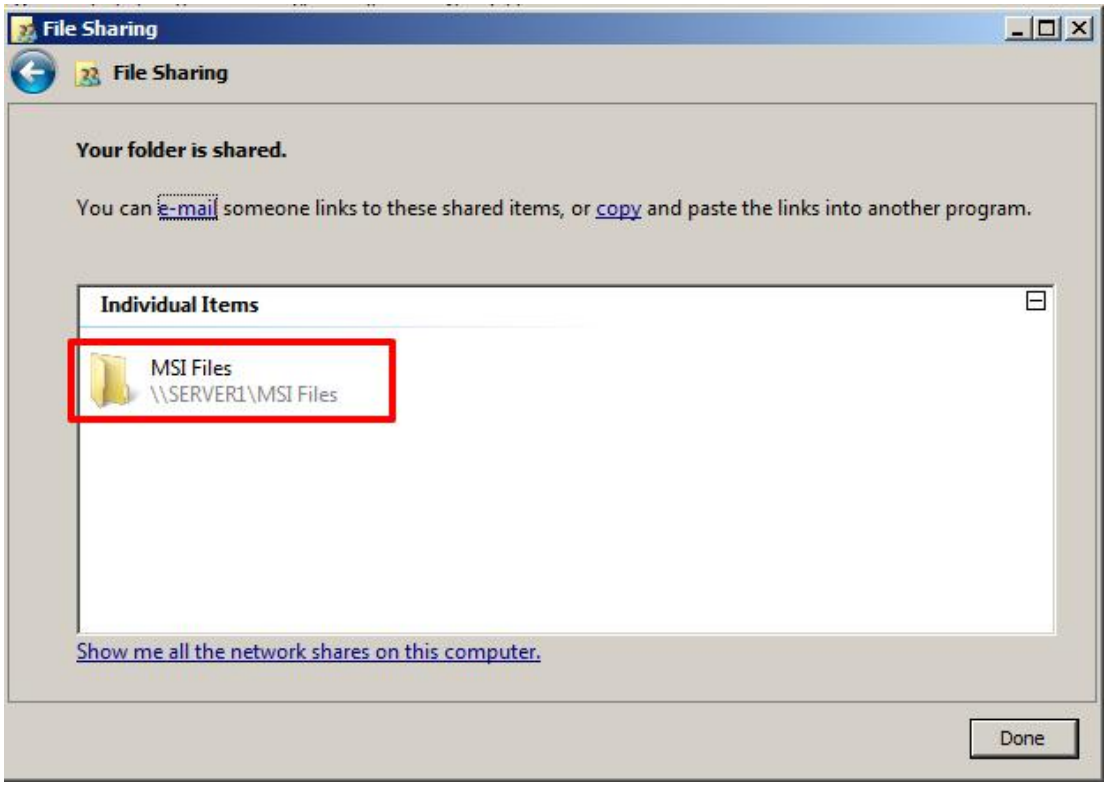


8.2.5 Subtask 5 - MSI File Publishing Group Policy Object

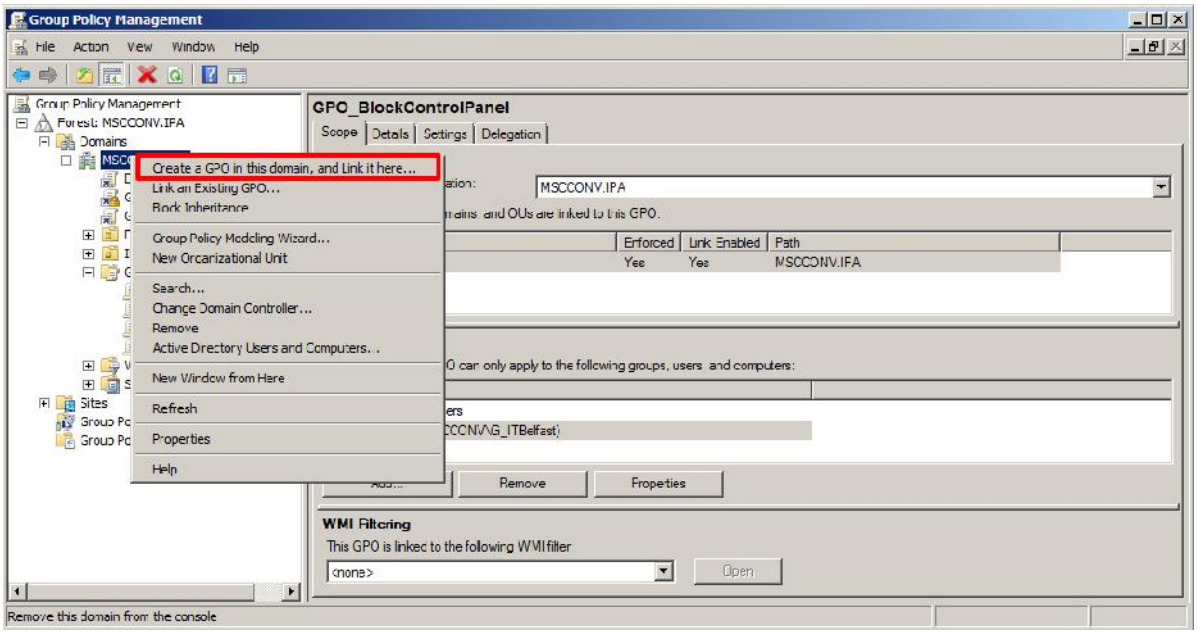
It is possible to use a GPO to publish a package, and thus share out an MSI installation package out to users on the network, who can then install the package by using Add or Remove Programs.

Our first step is to create a folder on the C drive of the Server1 machine called MSI Files, into which we save an MSI file for Powerpoint Viewer, and then share it out to the users in the G_ITDublin group, who are the users to whom the GPO will be applied.

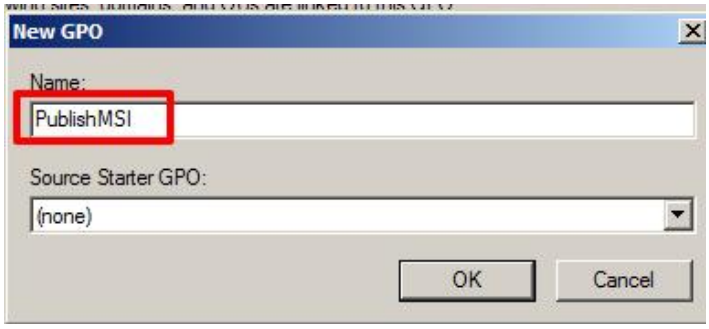



File Sharing
File Sharing
Your folder is shared.
You can e-mail someone links to these shared items, or copy and paste the links into another program.
Individual Items
MSI Files
\\SERVER1\MSI Files
Show me all the network shares on this computer.
Done

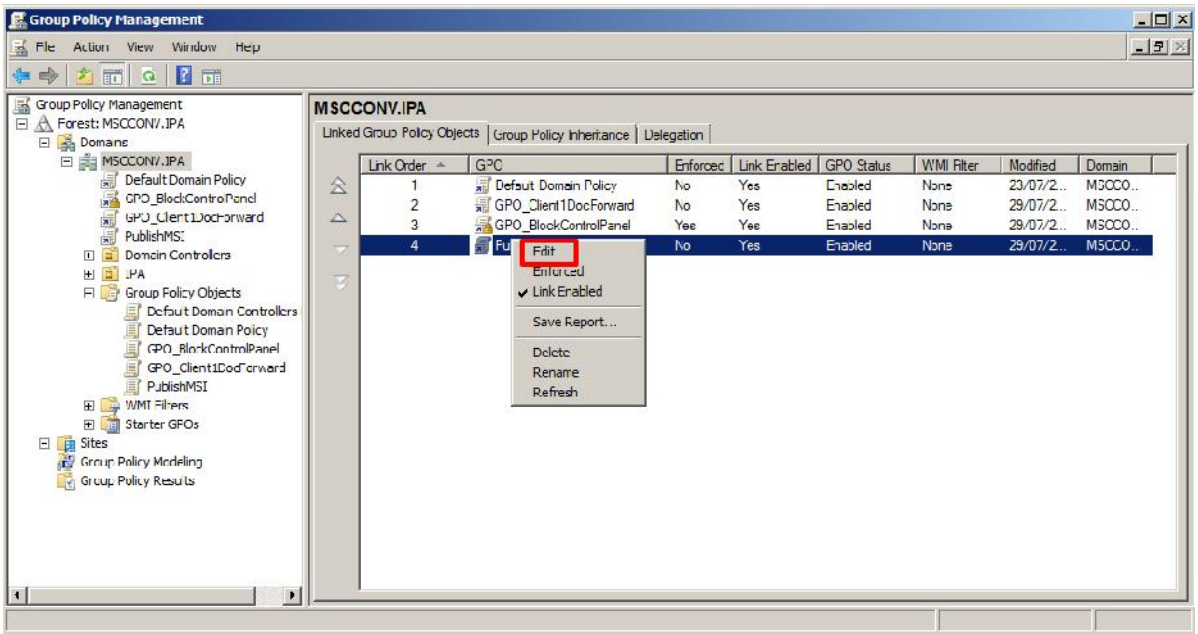
We then follow the same steps as described above for creating a GPO in the domain and linking it.



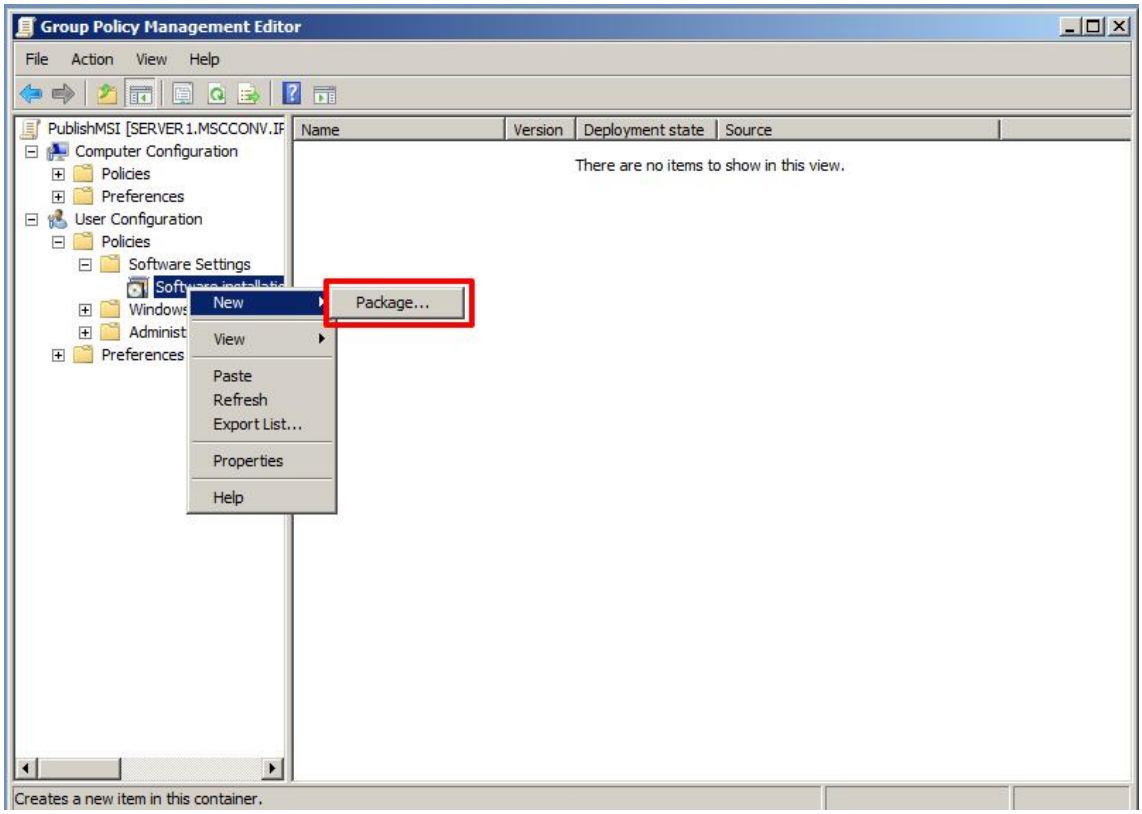
We name the GPO as PublishMSI.



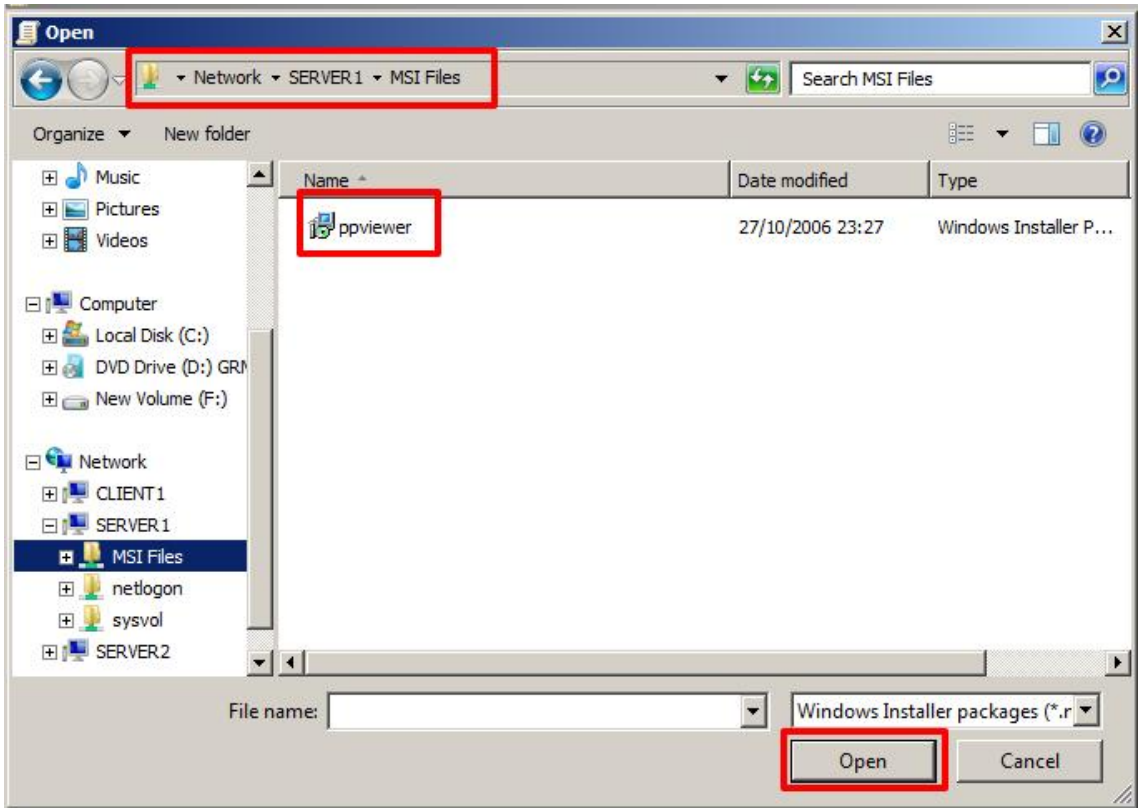
We then open the GPM Editor by right clicking on the GPO and clicking Edit.



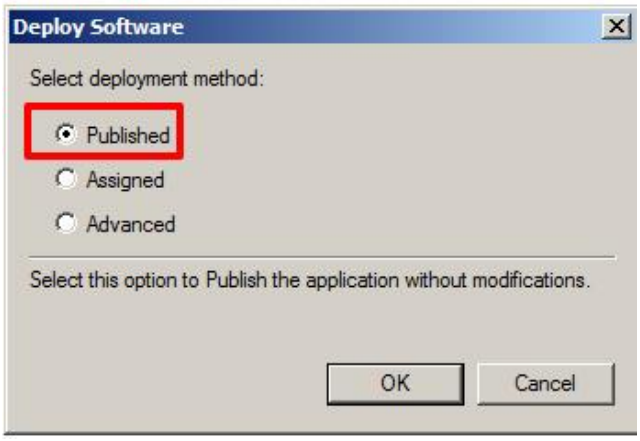
We then navigate to User Configuration, Policies, Software Settings. We right-click on Software installation and select New, Package.



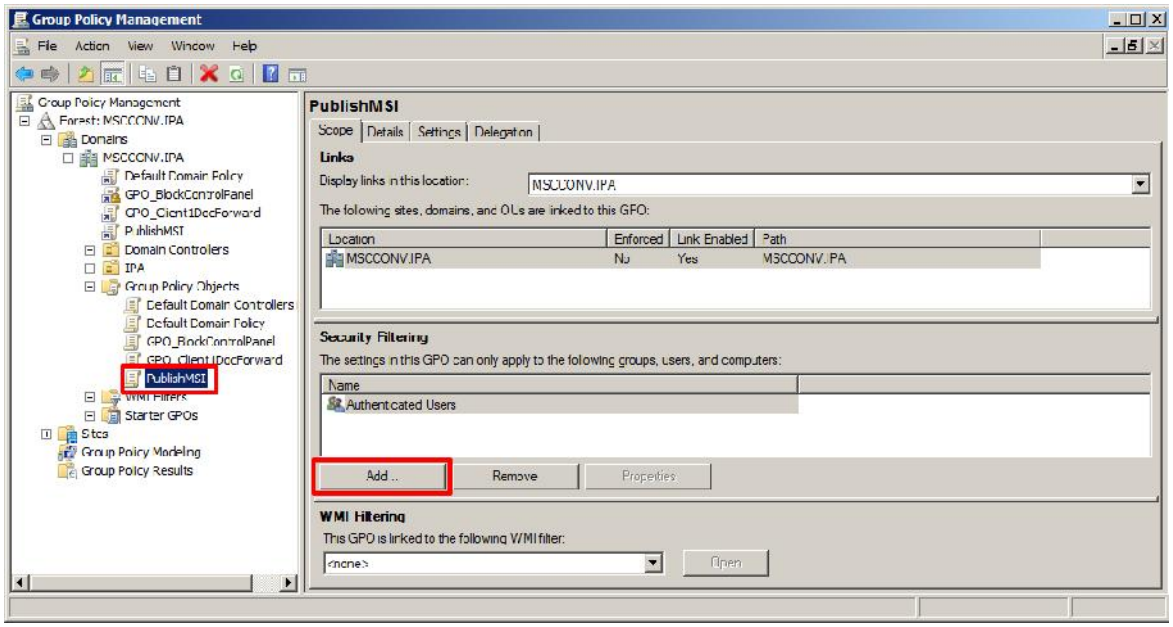
We then navigate to the MSI Files share on Server1 that we created above, and select the ppviewer MSI file.



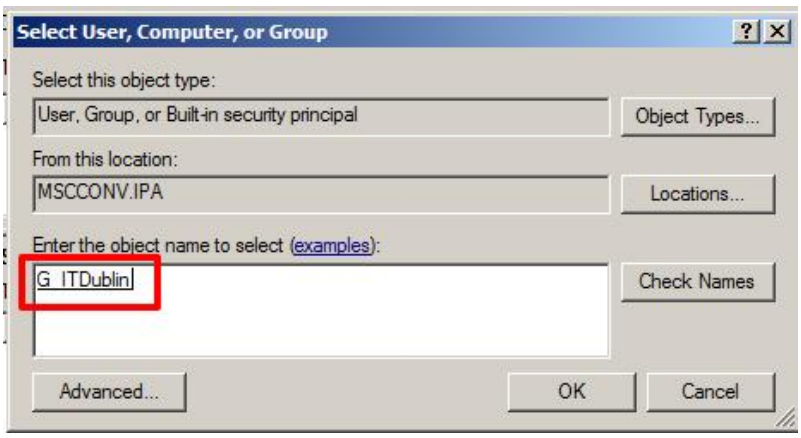
In order for the powerpoint viewer program to be added to the Add or Remove Programs list for users to whom the GPO is applied, we then tick the Published deployment method radio button, and click OK.



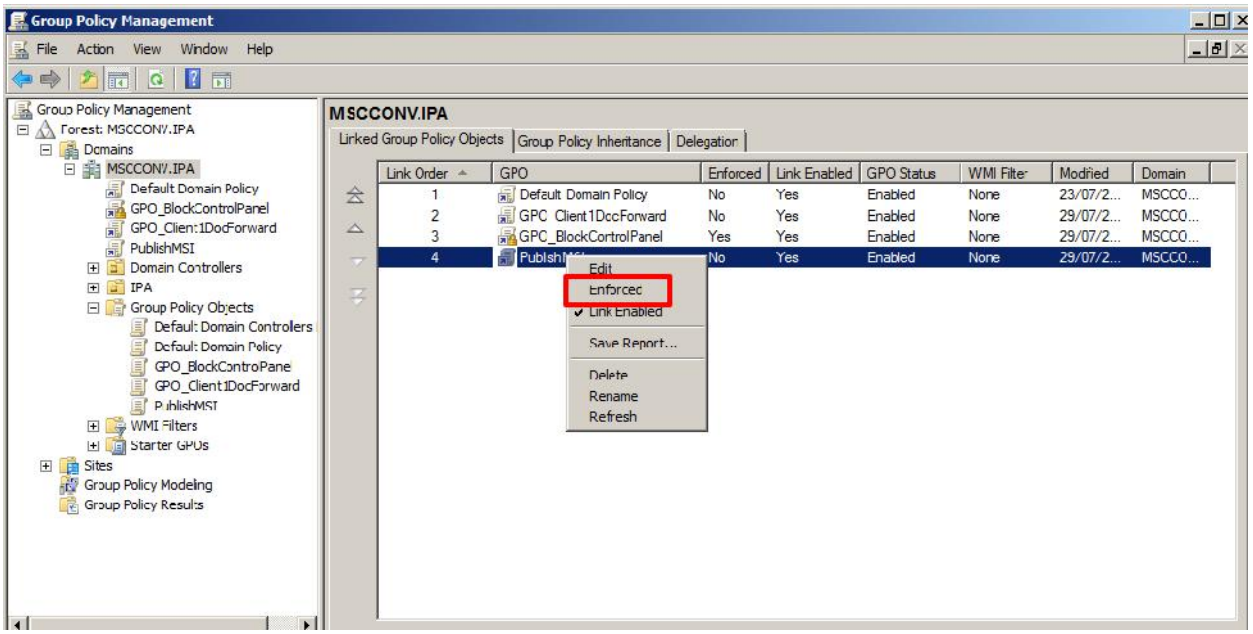
The next step is to add users/groups to whom the GPO will apply. Within the GPM snap-in we select the GPO and click Add under the Security Filtering section.



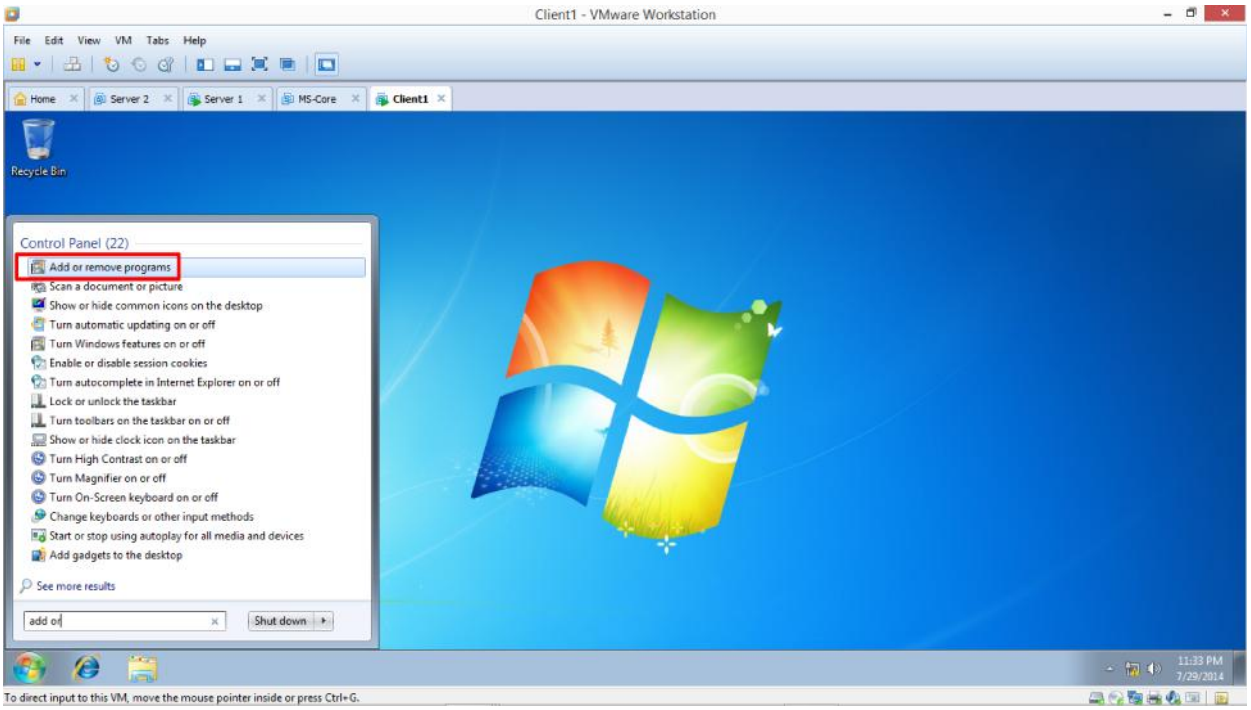
We then select the G_ITDublin group and click OK.



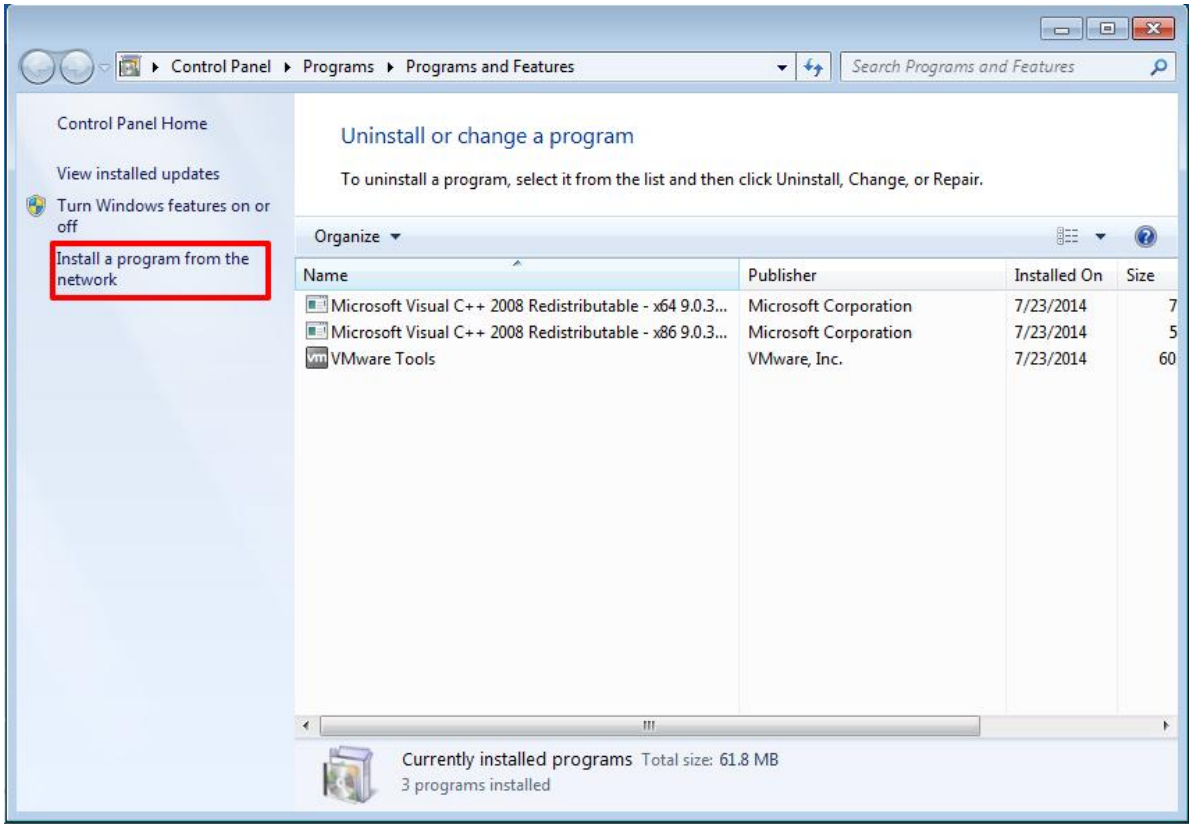
Finally, we right-click on the GPO and make sure that it is Enabled, and then click Enforced.



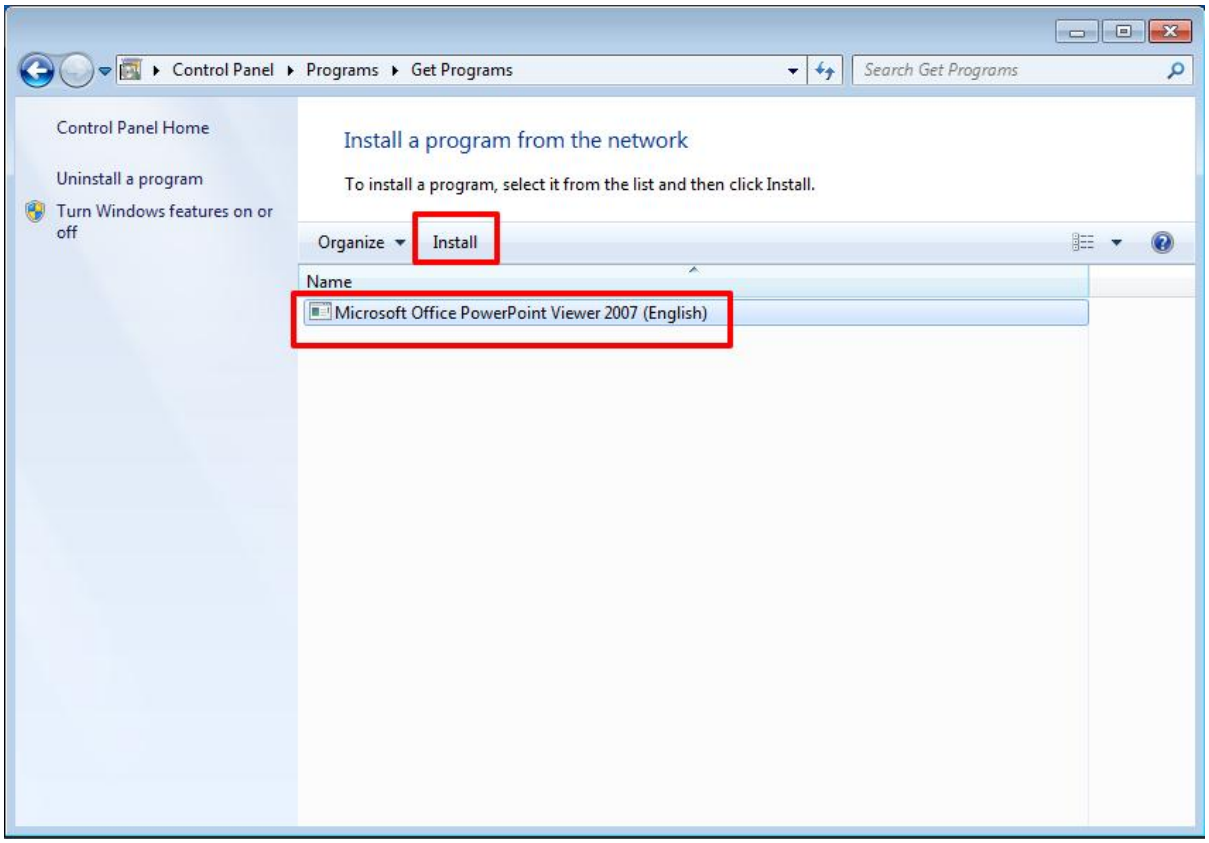
We can then log on to the client1 machine as one of the Dublin OU users. We search for Add or remove programs in the search bar on the start menu and then open Add or remove programs.


Client1 - VMware Workstation
File Edit View VM Tabs Help
Home
Server 2
Server 1
MS-Core
Client1
Recycle Bin
Control Panel (22)
Add or remove programs
Scan a document or picture
Show or hide common icons on the desktop
Turn automatic updating on or off
Turn Windows features on or off
Enable or disable session cookies
Turn autocomplete in Internet Explorer on or off
Lock or unlock the taskbar
Turn toolbars on the taskbar on or off
Show or hide clock icon on the taskbar
Turn High Contrast on or off
Turn Magnifier on or off
Turn On-Screen keyboard on or off
Change keyboards or other input methods
Start or stop using autoplay for all media and devices
Add gadgets to the desktop
See more results
add of
Shut down
11:33 PM
7/29/2014
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

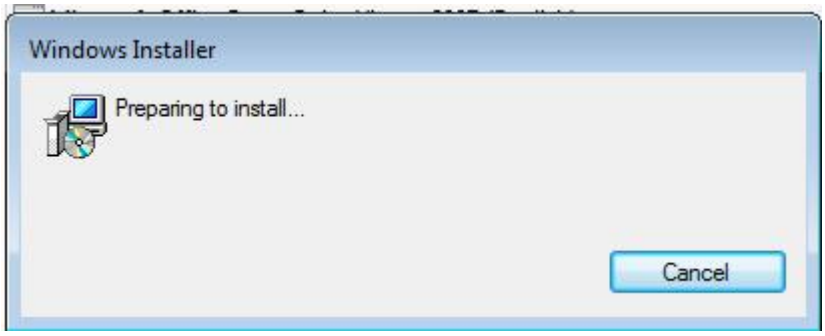
We then click on Install a program from the network.



We can then see that we have the option to install Microsoft Office PowerPoint viewer, which we can select and then click Install.


Control Panel ▸ Programs ▸ Get Programs
Search Get Programs
Control Panel Home
Uninstall a program
Turn Windows features on or off
Install a program from the network
To install a program, select it from the list and then click Install.
Organize
Install
Name
Microsoft Office PowerPoint Viewer 2007 (English)

The installation process then begins.



9. Part B - Task F

- *Setup the MS-Core server as a file server*
- *Configure MS-Core for Windows Remote administration.*
- *Access MS-Core from Client2 using remote desktop*

9.1 Preamble

As the MS-Core server has been set up as a member server of the domain, it does not handle administrative services such as user authentication. Member servers do however provide services to the domain, such as print serving or file serving.

A file server is defined[24] as a computer attached to a network that has the primary purpose of providing a location for shared storage of computer files that can be accessed by the workstations that are attached to the same network.

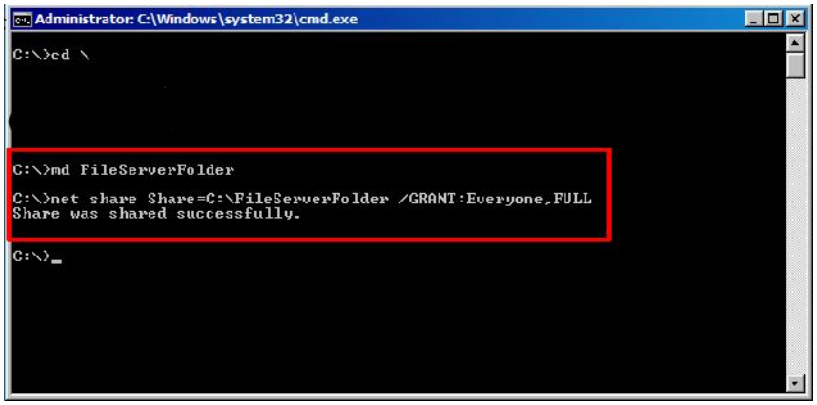
The availability of Remote Administration in systems management means that instead of having to physically go to a server to perform administrative duties, system administrators can access a server remotely from their current location. Using Remote Administration, the graphical interface of a computer can be displayed over a network onto another correctly configured computer. In larger organisations, with many servers, this can be save time and improve efficiency.

9.2 Procedure

9.2.1 Subtask 1 - Set Up MS-Core Server as a Files Server

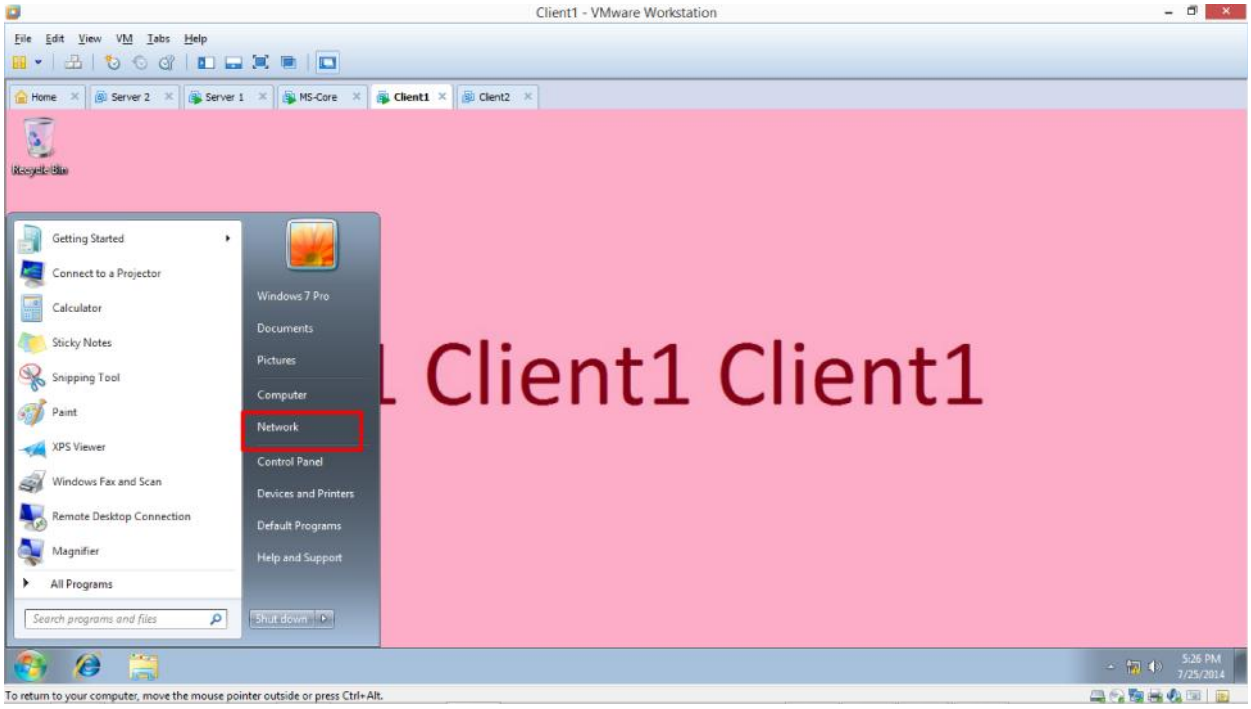
The method we will use to setup MS-Core as a file server is to create a folder on the MS-Core machine and then share that folder out to our network. On the MS-Core machine we open the command prompt and navigate back to the root directory by typing 'cd \'

We then create a folder called FileServerFolder and create a Share on that folder called Share which is available to everyone on our network by typing:
'net share Share=C:\FileServerFolder /GRANT:Everyone,FULL

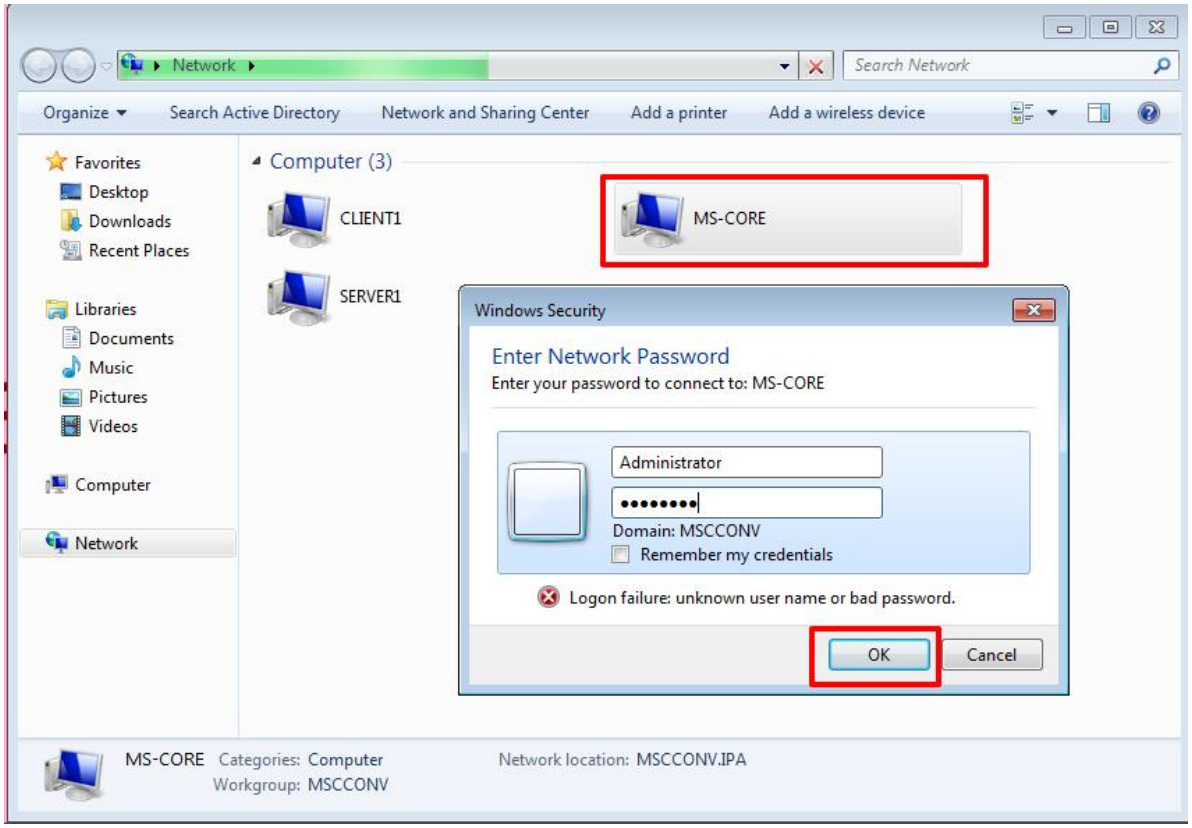


[24] http://en.wikipedia.org/wiki/File_server. Accessed July 20, 2014.

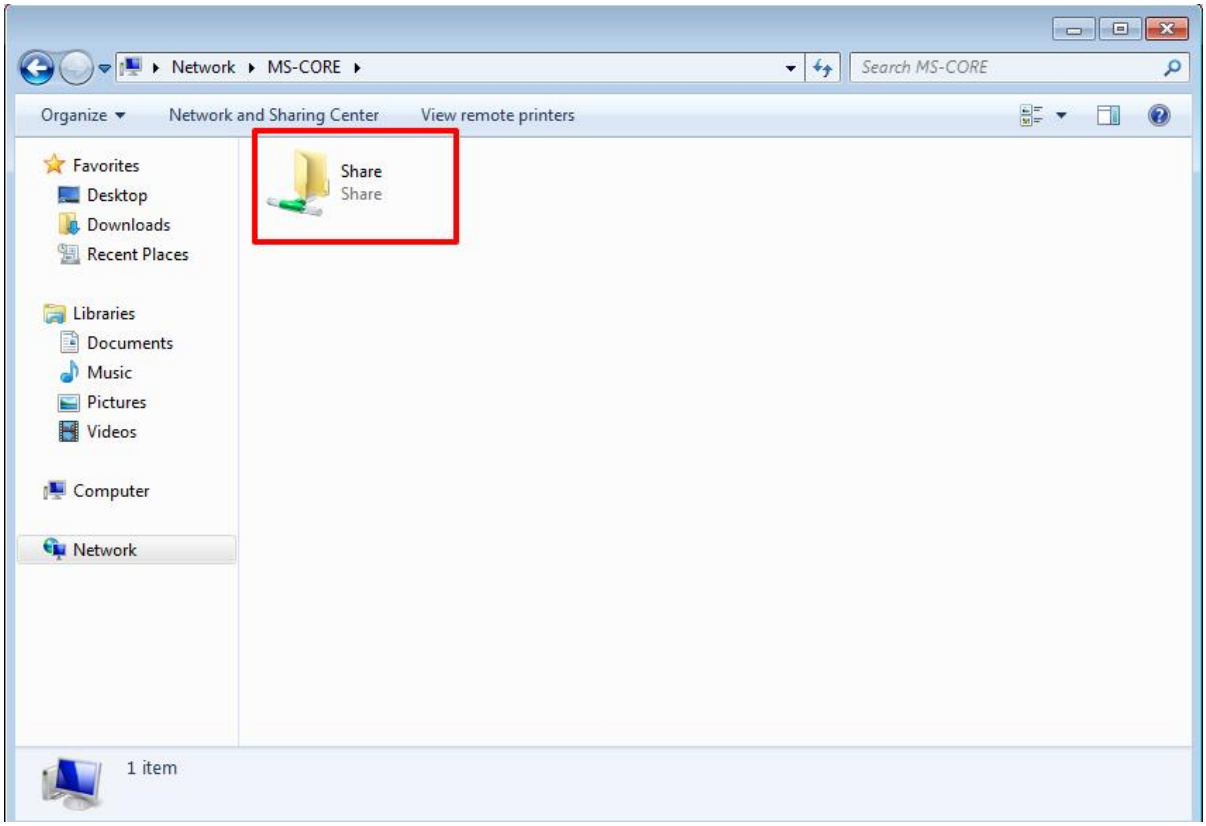
As all users on the network have been granted full access to this folder, anyone can now read or write to this network share, as is illustrated below by opening client 1 and clicking Start, Network.



When we open MS-CORE, we are prompted to enter our network credentials.

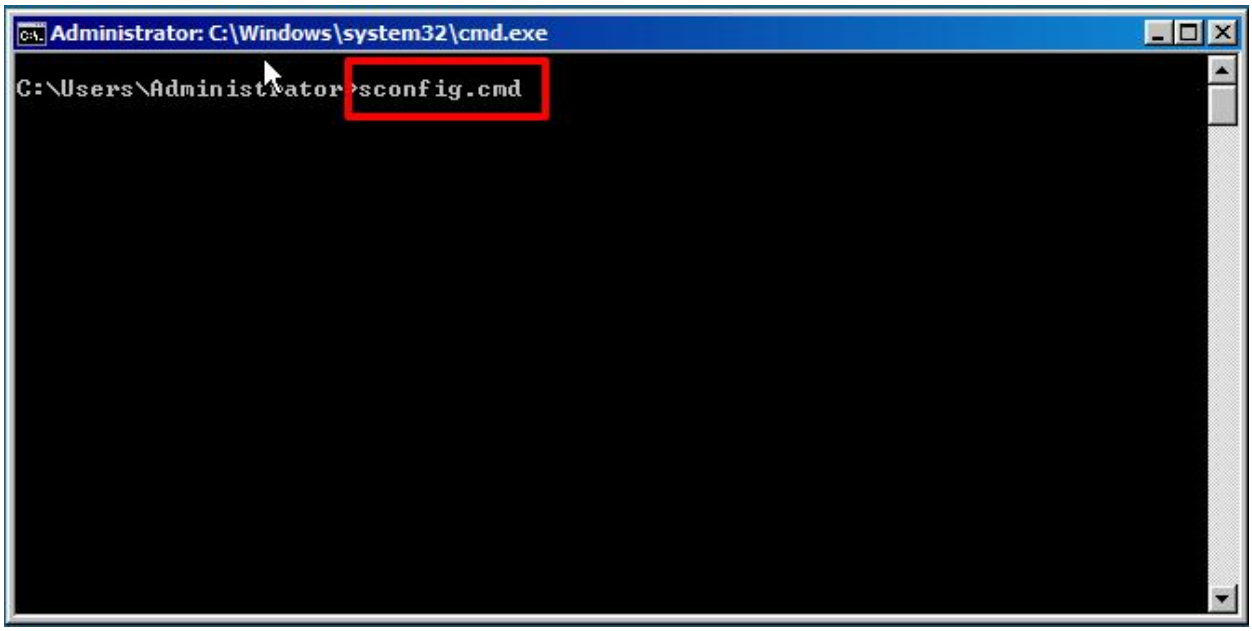


We can then see that the Share folder, which is located on the root directory of the MS-Core server, is available from the Client1 workstation.

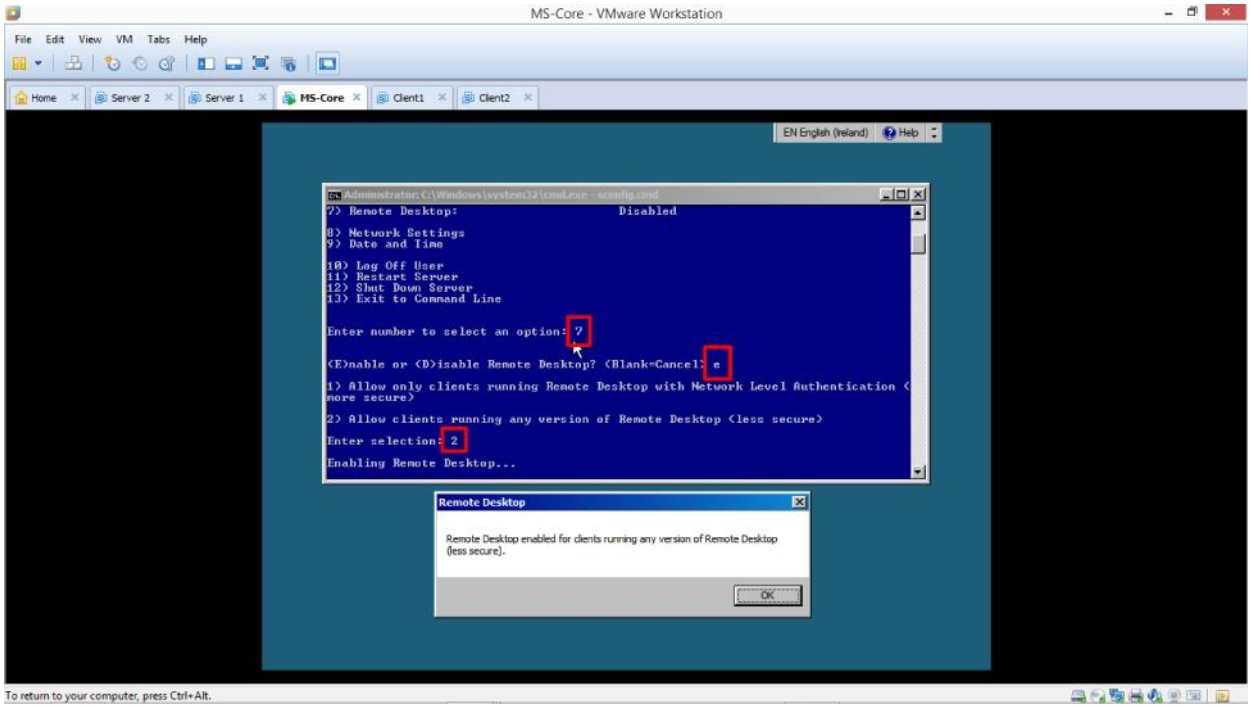


9.2.2 Subtask 2 - Configure MS-Core for Windows Remote Administration

In order to configure MS-Core for Windows Remote Administration we type 'sconfig.smd' from the command line of MS-Core.



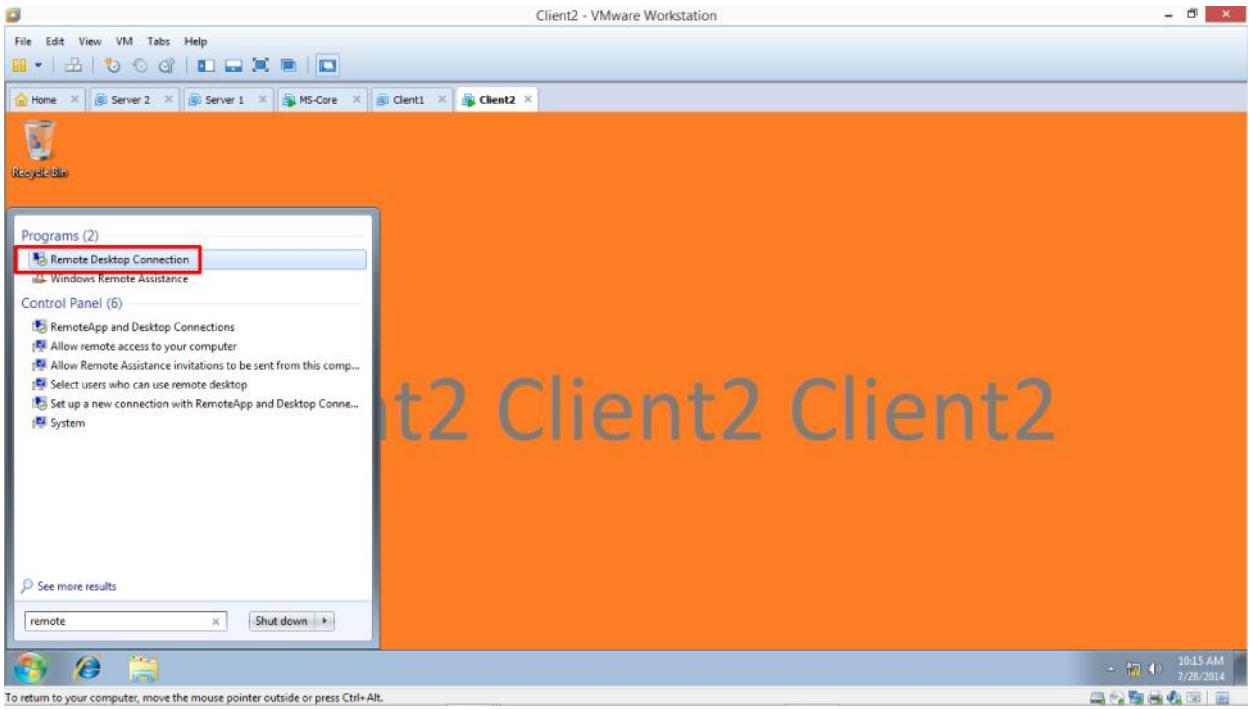
The server configuration tool is then launched from where we type '7' for Remote Desktop, which is disabled by default. We then type 'e' to enable Remote Desktop. We then type '2' to enable Remote Desktop for clients running any version of Remote Desktop. We then see a window confirming that Remote Desktop has been enabled.


MS-Core - VMware Workstation
File Edit View VM Tabs Help
Home Server 2 Server 1 MS-Core Client1 Client2
EN English (Ireland) Help
7) Remote Desktop: Disabled
8) Network Settings
9) Date and Time
10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line
Enter number to select an option: 7
(E)nable or (D)isable Remote Desktop? (Blank=Cancel) e
1) Allow only clients running Remote Desktop with Network Level Authentication (more secure)
2) Allow clients running any version of Remote Desktop (less secure)
Enter selection: 2
Enabling Remote Desktop...
Remote Desktop
Remote Desktop enabled for clients running any version of Remote Desktop (less secure).
OK
To return to your computer, press Ctrl+Alt.

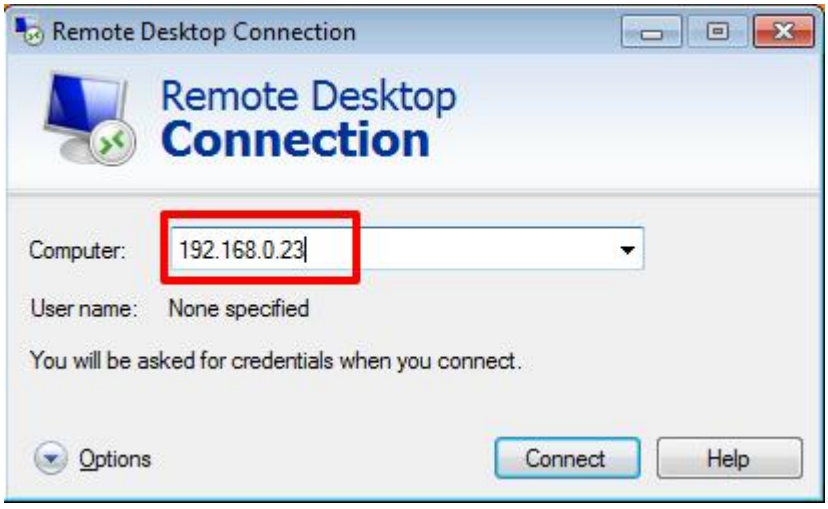
9.2.3 Subtask 3 - Access MS-Core from Client2 Using Remote Desktop

To access MS-Core remotely we will need to know its IP address, which can be found from the MS-Core command line by typing 'ipconfig'.

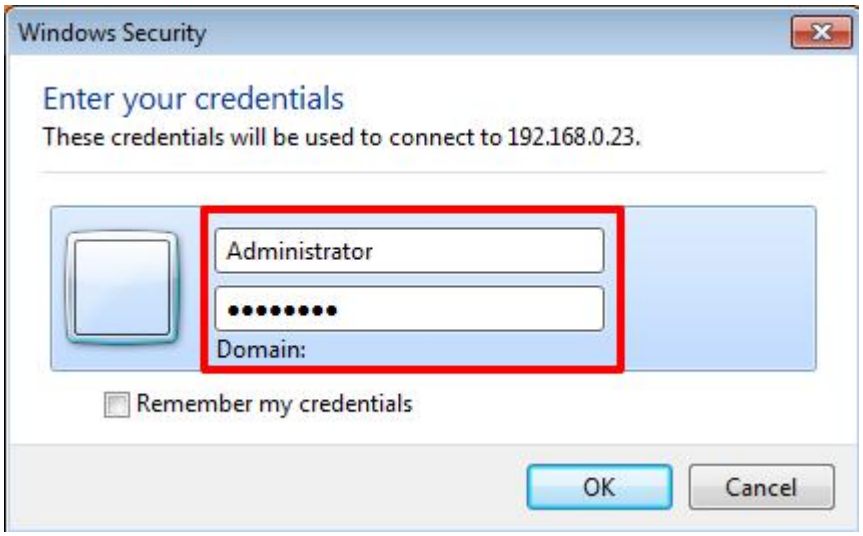
From the Client1 machine we search for Remote Desktop Connection on the Start menu, and then open Remote Desktop Connection.


Client2 - VMware Workstation
File Edit View VM Tabs Help
Home Server 2 Server 1 MS-Core Client1 Client2
Recycle Bin
Programs (2)
Remote Desktop Connection
Windows Remote Assistance
Control Panel (6)
RemoteApp and Desktop Connections
Allow remote access to your computer
Allow Remote Assistance invitations to be sent from this comp...
Select users who can use remote desktop
Set up a new connection with RemoteApp and Desktop Conne...
System
See more results
remote
Shut down
10:15 AM
7/28/2014
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

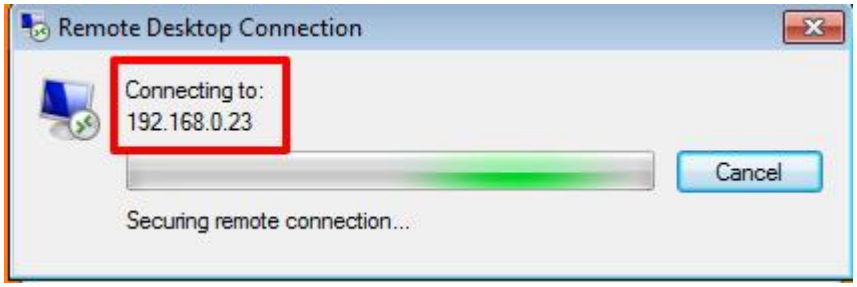
The Remote Desktop Connection application is then launched, where we enter the IP address for the MS-Core server, and click Connect.



We are then prompted to enter the required Administrator credentials, the password for which we previously set as Pa$$w0rd.



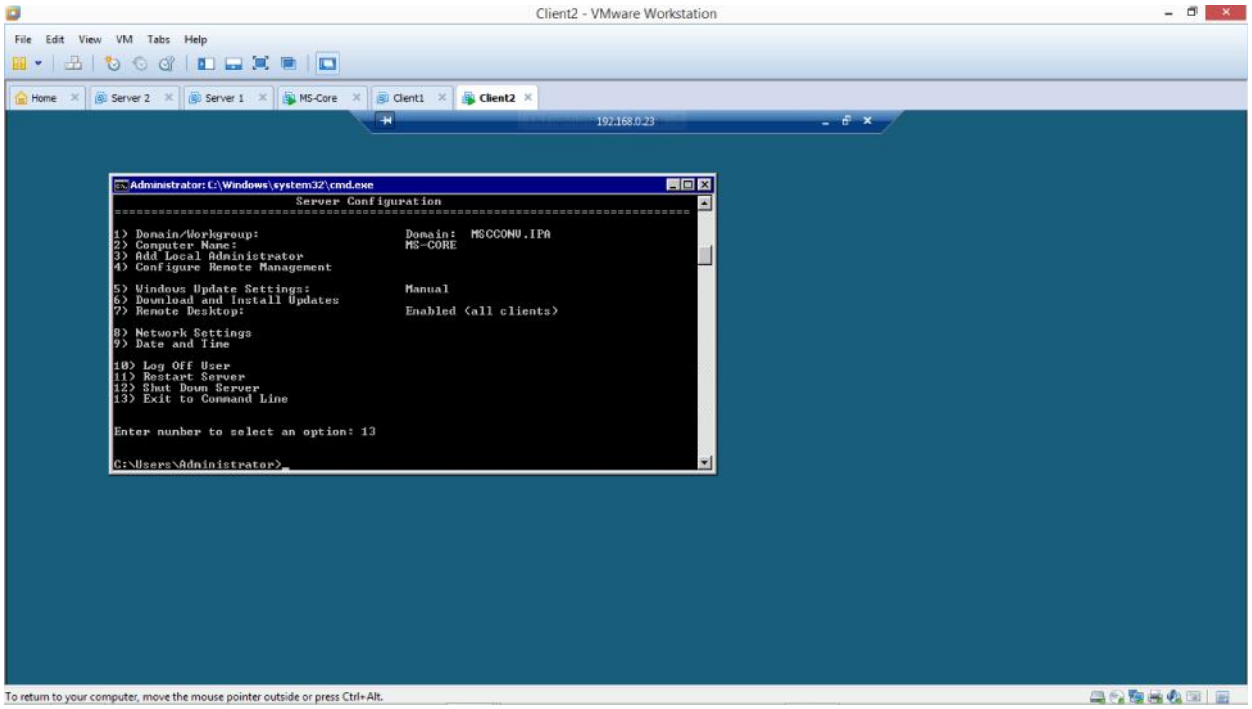
The application then begins to connect to MS-Core.

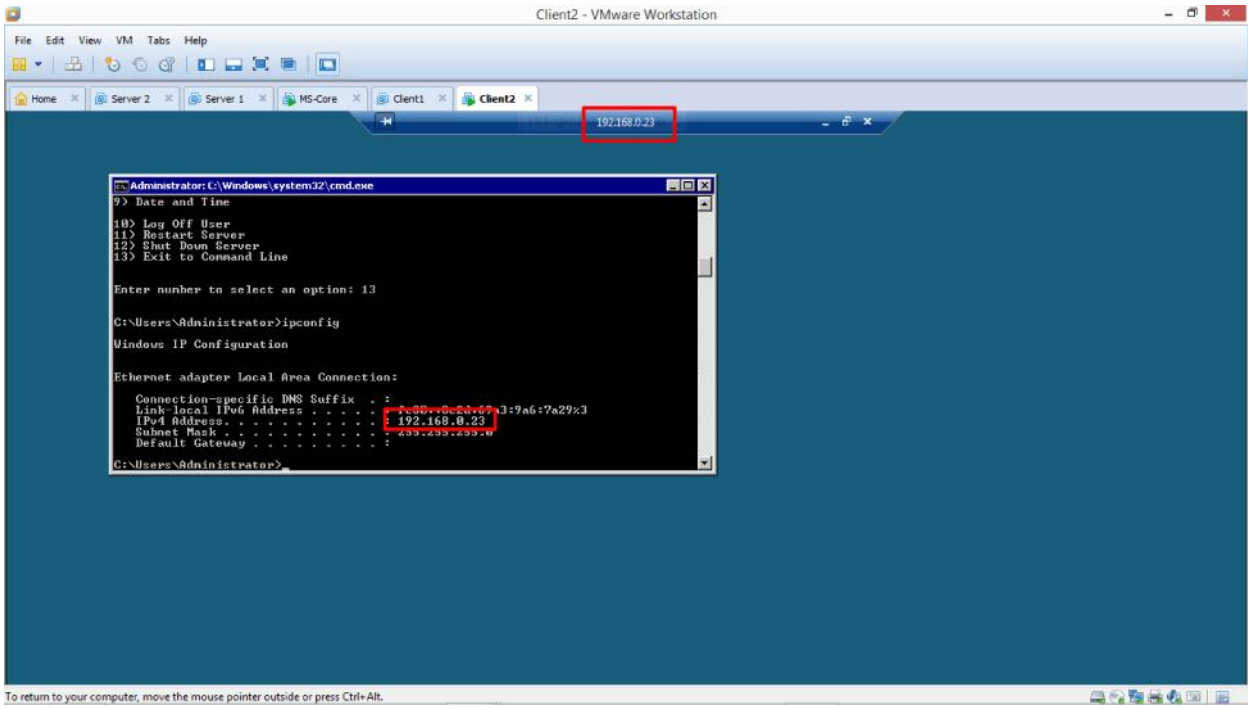


We accept the warning message advising that the identity of the remote computer cannot be identified.

Remote Desktop Connection
The identity of the remote computer cannot be verified. Do you want to connect anyway?
The remote computer could not be authenticated due to problems with its security certificate. It may be unsafe to proceed.
Certificate name
Name in the certificate from the remote computer:
MS-CORE.MSCCONV.IPA
Certificate errors
The following errors were encountered while validating the remote computer's certificate:
The certificate is not from a trusted certifying authority.
Do you want to connect despite these certificate errors?
Don't ask me again for connections to this computer
View certificate...
Yes
No

We can then see the MS-Core screen, where the server configuration tool is still open. We can exit this and then type 'ipconfig' to see the IP address of MS-Core and confirm that we are connected to the server from our client workstation.




Client2 - VMware Workstation
File Edit View VM Tabs Help
Home
Server 2
Server 1
MS-Core
Client1
Client2
192.168.0.23
Administrator: C:\Windows\system32\cmd.exe
9) Date and Time
10) Log Off User
11) Restart Server
12) Shut Down Server
13) Exit to Command Line
Enter number to select an option: 13
C:\Users\Administrator>ipconfig
Windows IP Configuration
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . :9a6:7a29x3
IPv4 Address. . . . . : 192.168.0.23
Subnet Mask . . . . . :
Default Gateway . . . . . :
C:\Users\Administrator>
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

10. Part B - Task G

- *Install DHCP on Server2 with the scope 192.168.0.100 to 192.168.0.150, default mask and appropriate DNS address. Configure Client2 to obtain its address and TCP/IP settings from DHCP.*
- *If you disable DHCP services, what address will Client2 get?*

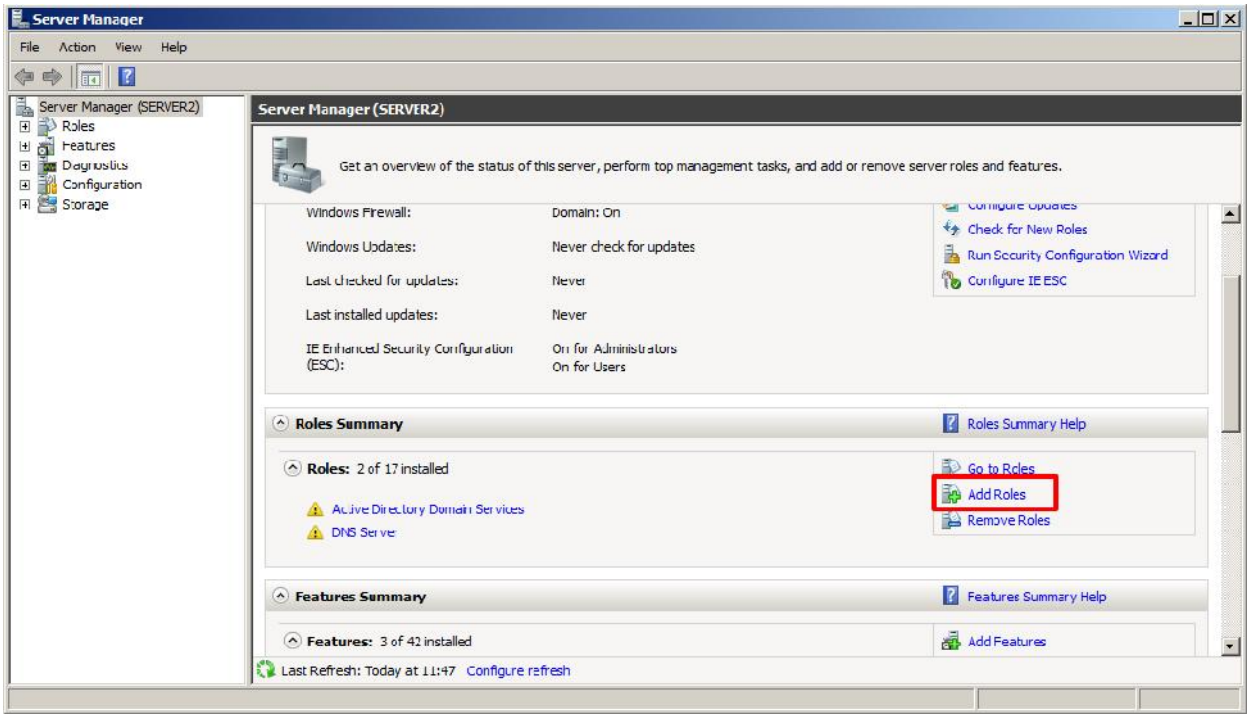
10.1 Preamble

The Dynamic Host Configuration Protocol (DHCP) is a TCP/IP protocol that is used to configure nodes connected to each other on a network. Nodes are assigned an IP address by the DHCP server, giving them a unique address on the network for communication purposes. The IP address they are given is determined by the class of network they are connected to and the scope that the DHCP server has been assigned. The main benefit of using a DHCP server, particularly in a large organisation, is that DHCP automatically allocates IP addresses within a set range when a node connects to a network. It means that administrators don't have to statically assign an IP address to each individual node, however IP address can still be assigned to nodes statically if a node such as a server has to be permanently at a particular IP address.

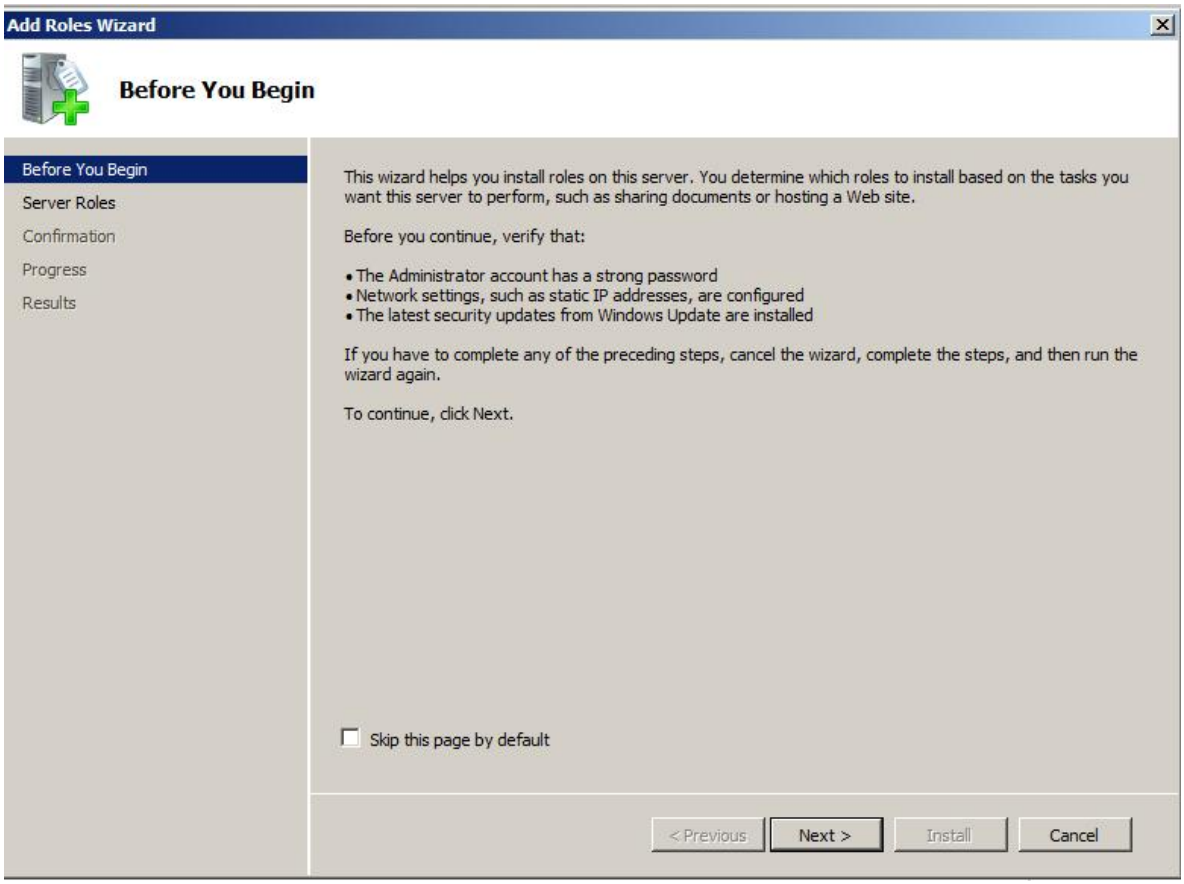
10.2 Procedure

10.2.1 Subtask 1 - Install DHCP on Server 2

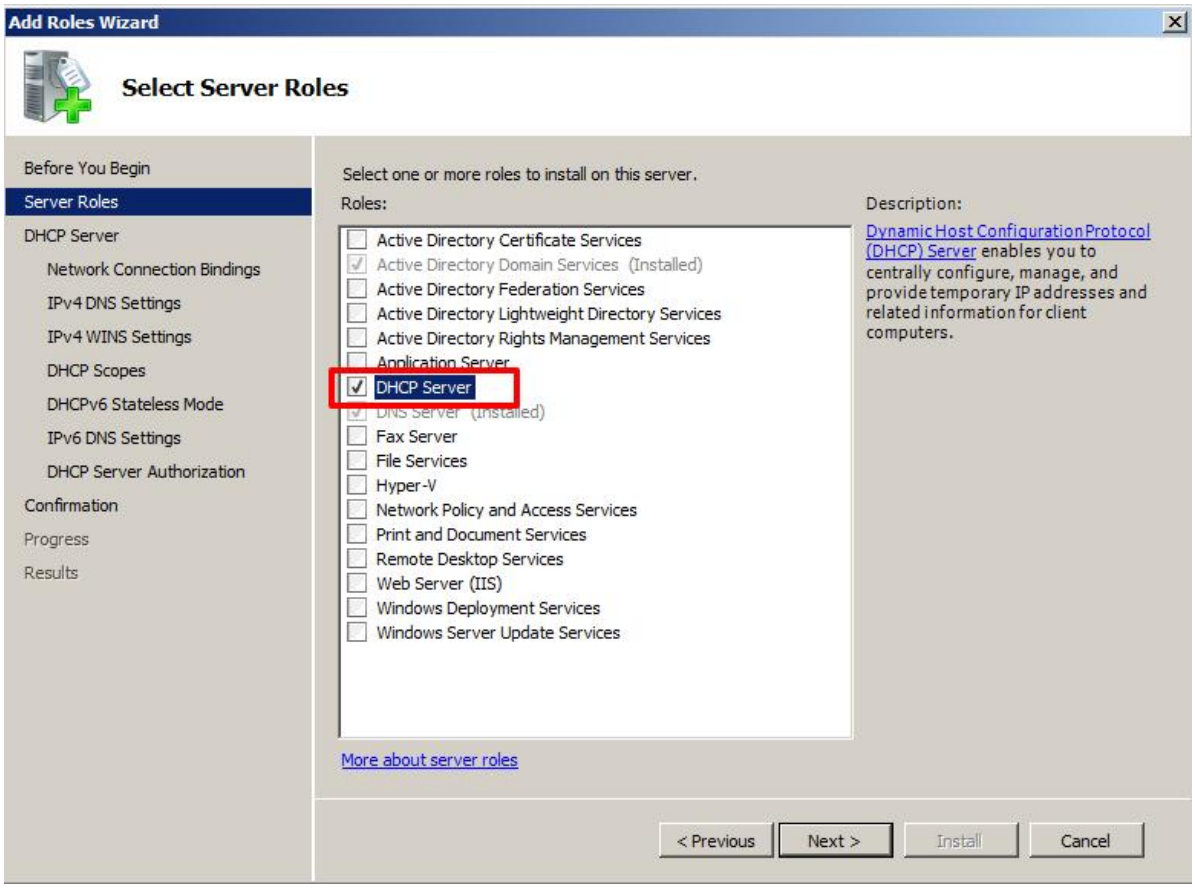
As DHCP is a server role our first step is to add this role to Server2. We open Server Manager and click Add Roles.



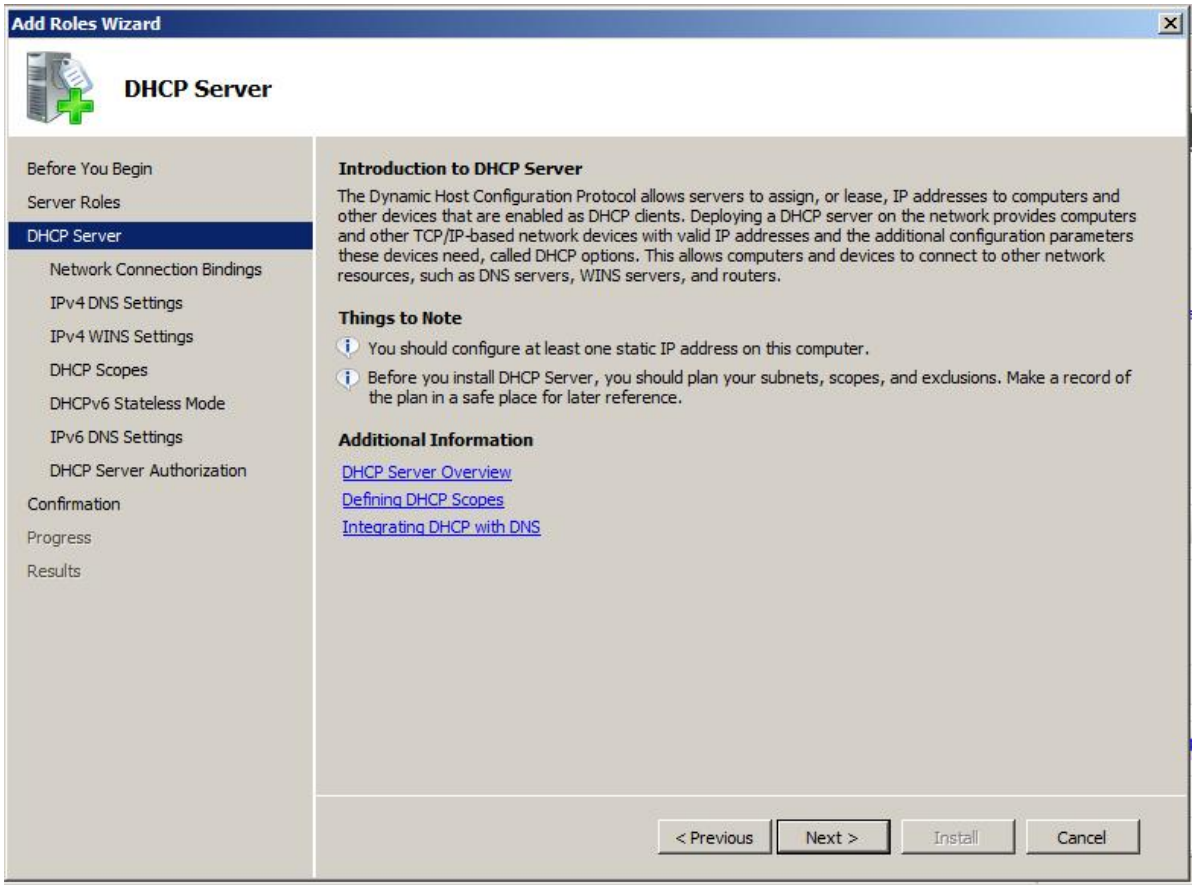
As with previous roles installations, a list of recommendations are given.


Add Roles Wizard
Before You Begin
Before You Begin
Server Roles
Confirmation
Progress
Results
This wizard helps you install roles on this server. You determine which roles to install based on the tasks you want this server to perform, such as sharing documents or hosting a Web site.
Before you continue, verify that:
• The Administrator account has a strong password
• Network settings, such as static IP addresses, are configured
• The latest security updates from Windows Update are installed
If you have to complete any of the preceding steps, cancel the wizard, complete the steps, and then run the wizard again.
To continue, click Next.
Skip this page by default
< Previous
Next >
Install
Cancel

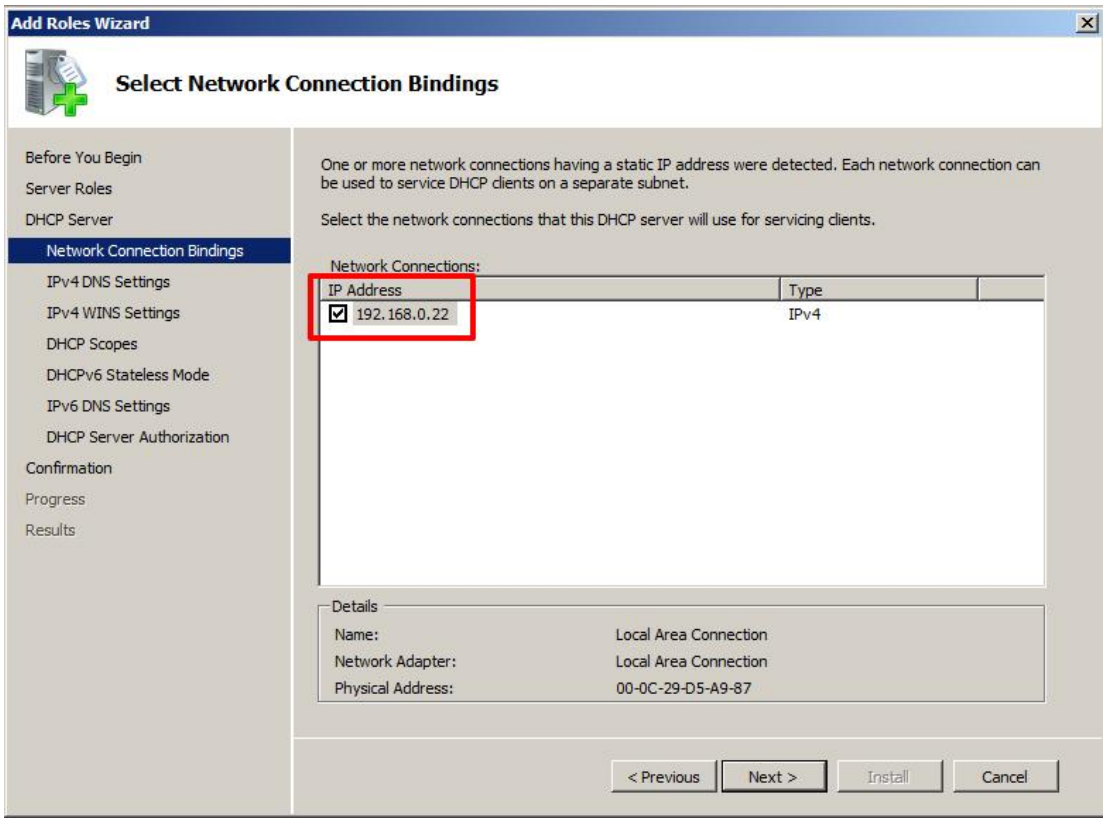
On the next window we check the tickbox for DHCP Server.



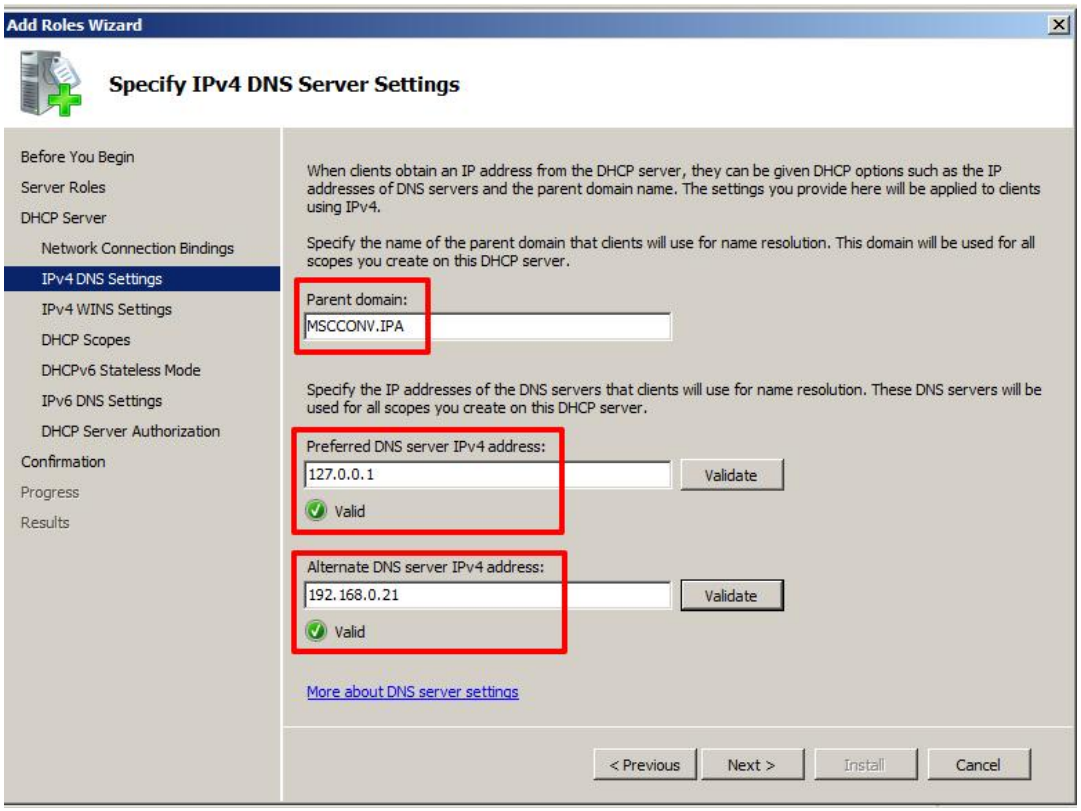
We then click Next at the DHCP overview window.


Add Roles Wizard
DHCP Server
Before You Begin
Server Roles
DHCP Server
Network Connection Bindings
IPv4 DNS Settings
IPv4 WINS Settings
DHCP Scopes
DHCPv6 Stateless Mode
IPv6 DNS Settings
DHCP Server Authorization
Confirmation
Progress
Results
Introduction to DHCP Server
The Dynamic Host Configuration Protocol allows servers to assign, or lease, IP addresses to computers and other devices that are enabled as DHCP clients. Deploying a DHCP server on the network provides computers and other TCP/IP-based network devices with valid IP addresses and the additional configuration parameters these devices need, called DHCP options. This allows computers and devices to connect to other network resources, such as DNS servers, WINS servers, and routers.
Things to Note
You should configure at least one static IP address on this computer.
Before you install DHCP Server, you should plan your subnets, scopes, and exclusions. Make a record of the plan in a safe place for later reference.
Additional Information
DHCP Server Overview
Defining DHCP Scopes
Integrating DHCP with DNS
< Previous
Next >
Install
Cancel

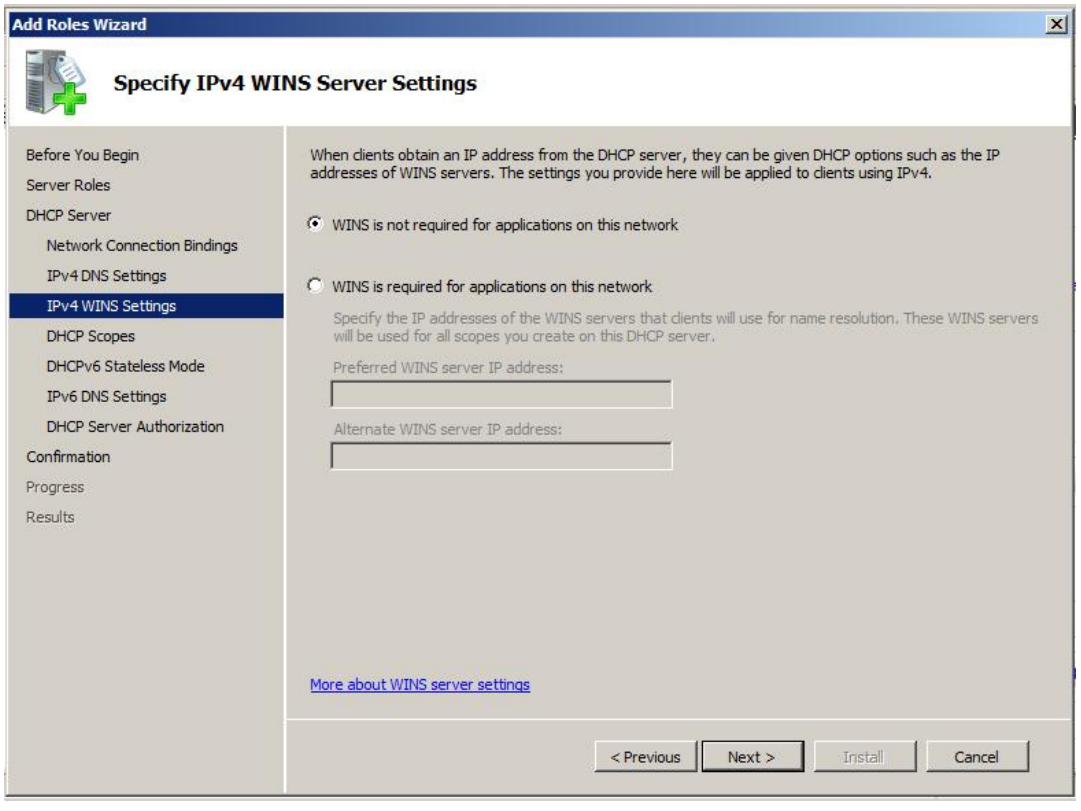
We then tick the checkbox for the IP address that will be used for the DHCP server will use, which is the IP address of Server2.



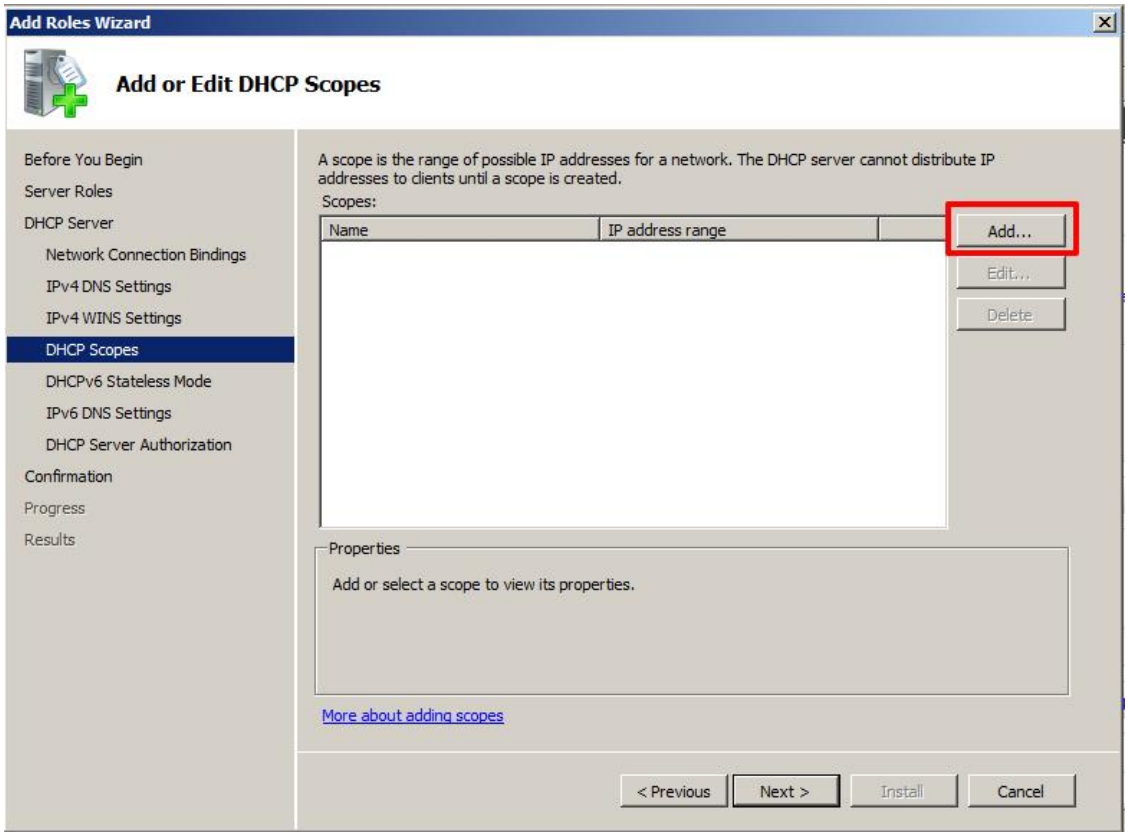
At the next window we enter our domain name, MSCCONV.IPA, the local host address for Server2, 127.0.0.1 which is used as out preferred DNS Server, and the IP address of Server1, which will be used as the alternate DNS server.


Add Roles Wizard
Specify IPv4 DNS Server Settings
Before You Begin
Server Roles
DHCP Server
Network Connection Bindings
IPv4 DNS Settings
IPv4 WINS Settings
DHCP Scopes
DHCPv6 Stateless Mode
IPv6 DNS Settings
DHCP Server Authorization
Confirmation
Progress
Results
When clients obtain an IP address from the DHCP server, they can be given DHCP options such as the IP addresses of DNS servers and the parent domain name. The settings you provide here will be applied to clients using IPv4.
Specify the name of the parent domain that clients will use for name resolution. This domain will be used for all scopes you create on this DHCP server.
Parent domain:
MSCCONV.IPA
Specify the IP addresses of the DNS servers that clients will use for name resolution. These DNS servers will be used for all scopes you create on this DHCP server.
Preferred DNS server IPv4 address:
127.0.0.1
Validate
Valid
Alternate DNS server IPv4 address:
192.168.0.21
Validate
Valid
More about DNS server settings
< Previous
Next >
Install
Cancel

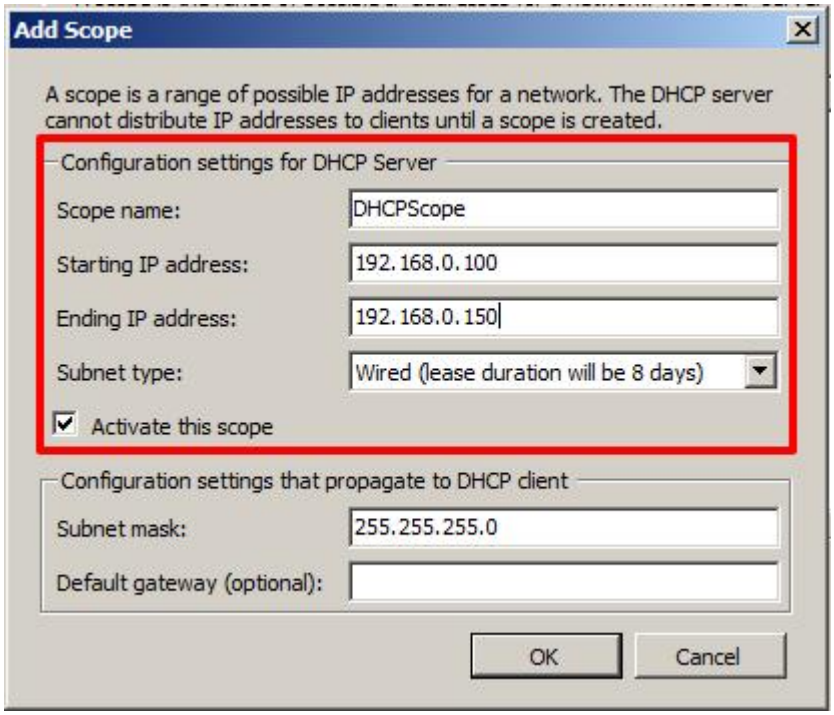
As WINS server settings are not required for our configuration we tick this radio box and click Next.


Add Roles Wizard
Specify IPv4 WINS Server Settings
Before You Begin
Server Roles
DHCP Server
Network Connection Bindings
IPv4 DNS Settings
IPv4 WINS Settings
DHCP Scopes
DHCPv6 Stateless Mode
IPv6 DNS Settings
DHCP Server Authorization
Confirmation
Progress
Results
When clients obtain an IP address from the DHCP server, they can be given DHCP options such as the IP addresses of WINS servers. The settings you provide here will be applied to clients using IPv4.
WINS is not required for applications on this network
WINS is required for applications on this network
Specify the IP addresses of the WINS servers that clients will use for name resolution. These WINS servers will be used for all scopes you create on this DHCP server.
Preferred WINS server IP address:
Alternate WINS server IP address:
More about WINS server settings
< Previous
Next >
Install
Cancel

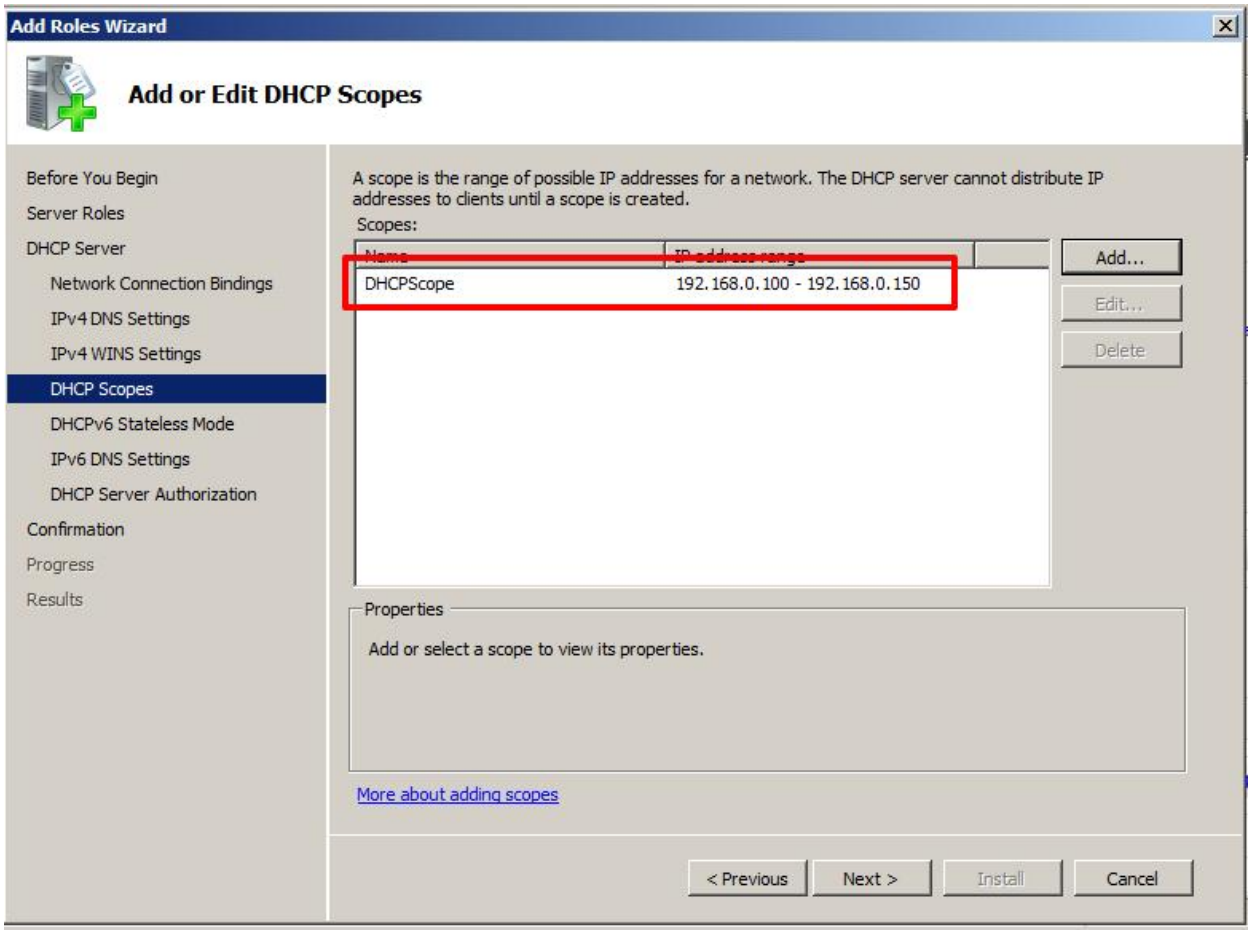
We will then specify our DHCP scope, and click Add to do this.



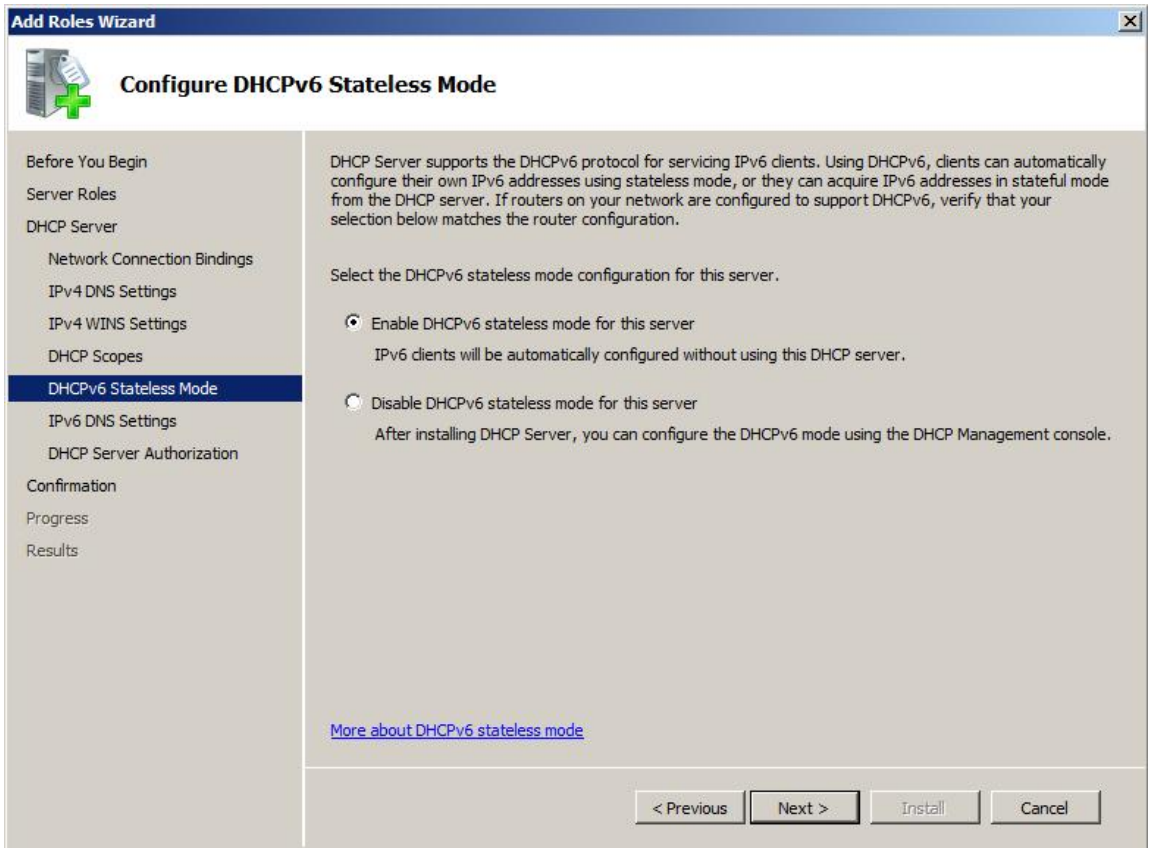
The next window allows to name the scope, and the starting and ending IP addresses, as well as the subnet mask, which we enter as per the assignment brief requirements.



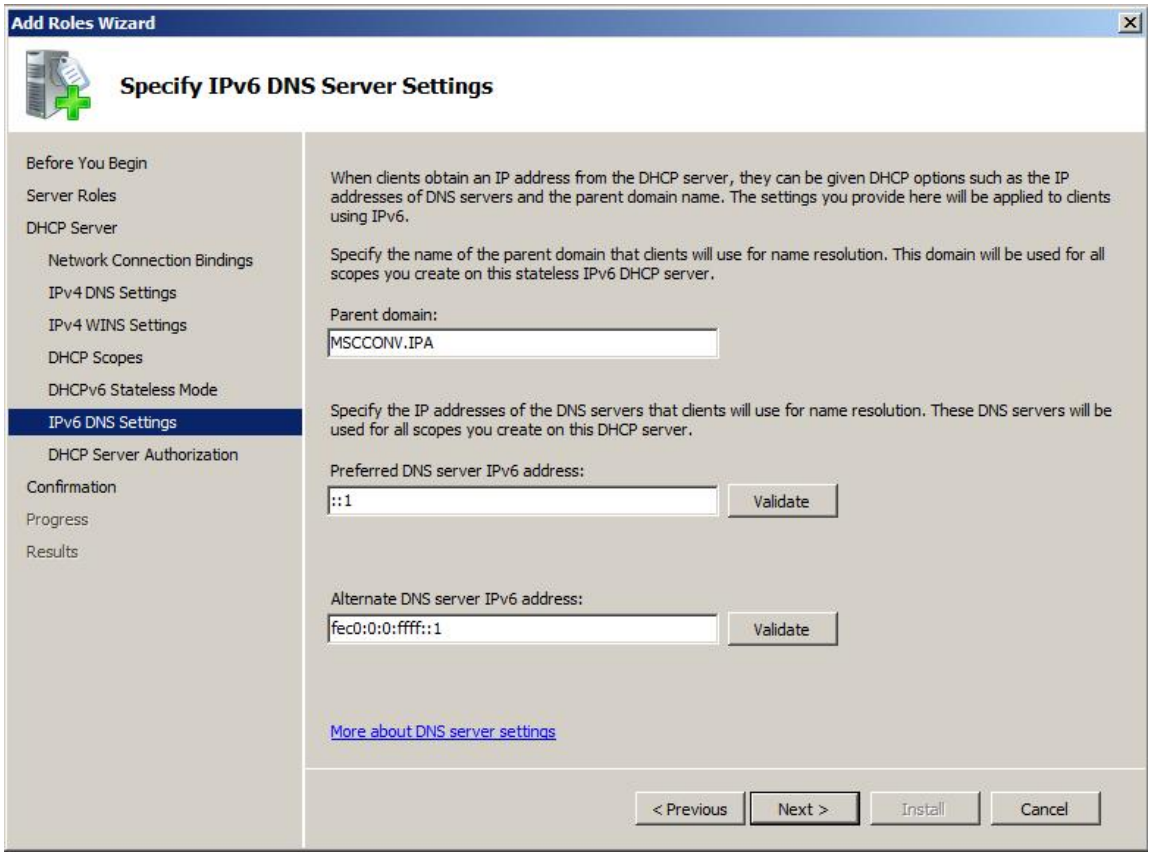
We can see that the scope has been added to the list.



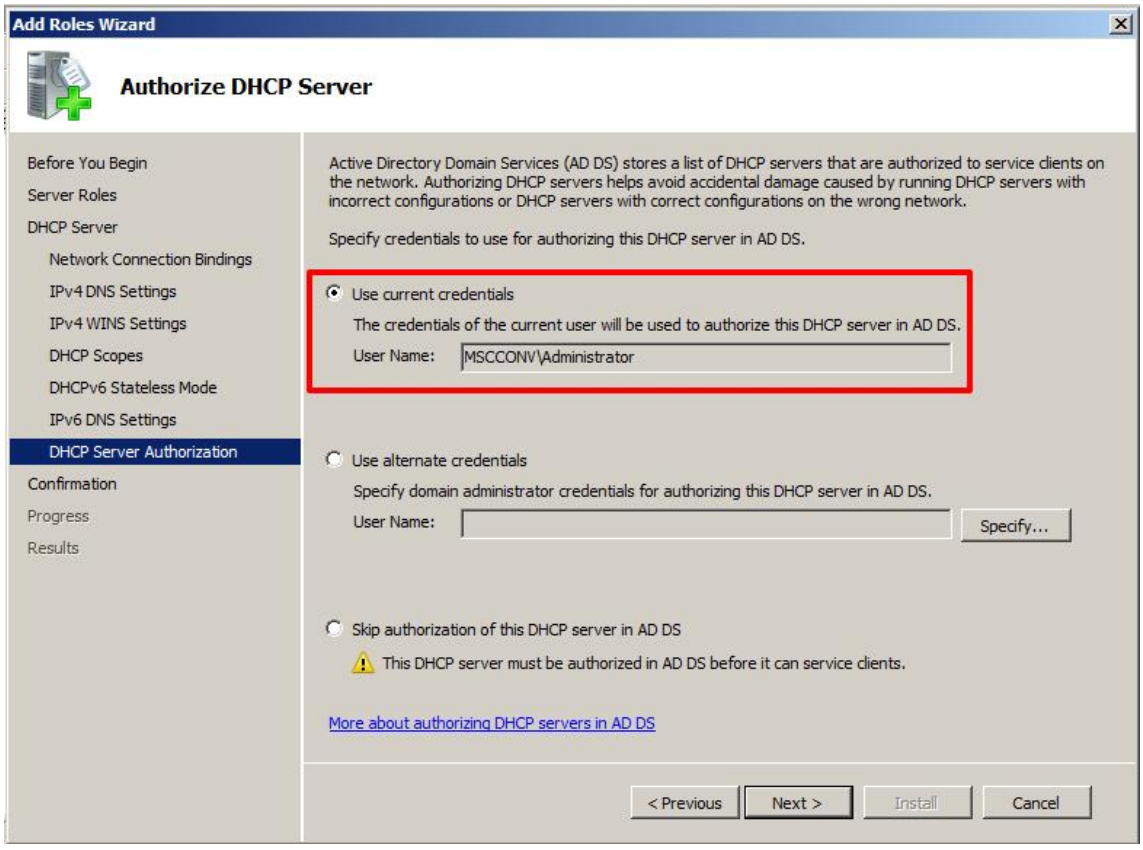
At the option to enable IPv6 stateless mode for the server we click Enable and then click Next.


Add Roles Wizard
Configure DHCPv6 Stateless Mode
Before You Begin
Server Roles
DHCP Server
Network Connection Bindings
IPv4 DNS Settings
IPv4 WINS Settings
DHCP Scopes
DHCPv6 Stateless Mode
IPv6 DNS Settings
DHCP Server Authorization
Confirmation
Progress
Results
DHCP Server supports the DHCPv6 protocol for servicing IPv6 clients. Using DHCPv6, clients can automatically configure their own IPv6 addresses using stateless mode, or they can acquire IPv6 addresses in stateful mode from the DHCP server. If routers on your network are configured to support DHCPv6, verify that your selection below matches the router configuration.
Select the DHCPv6 stateless mode configuration for this server.
Enable DHCPv6 stateless mode for this server
IPv6 clients will be automatically configured without using this DHCP server.
Disable DHCPv6 stateless mode for this server
After installing DHCP Server, you can configure the DHCPv6 mode using the DHCP Management console.
More about DHCPv6 stateless mode
< Previous
Next >
Install
Cancel

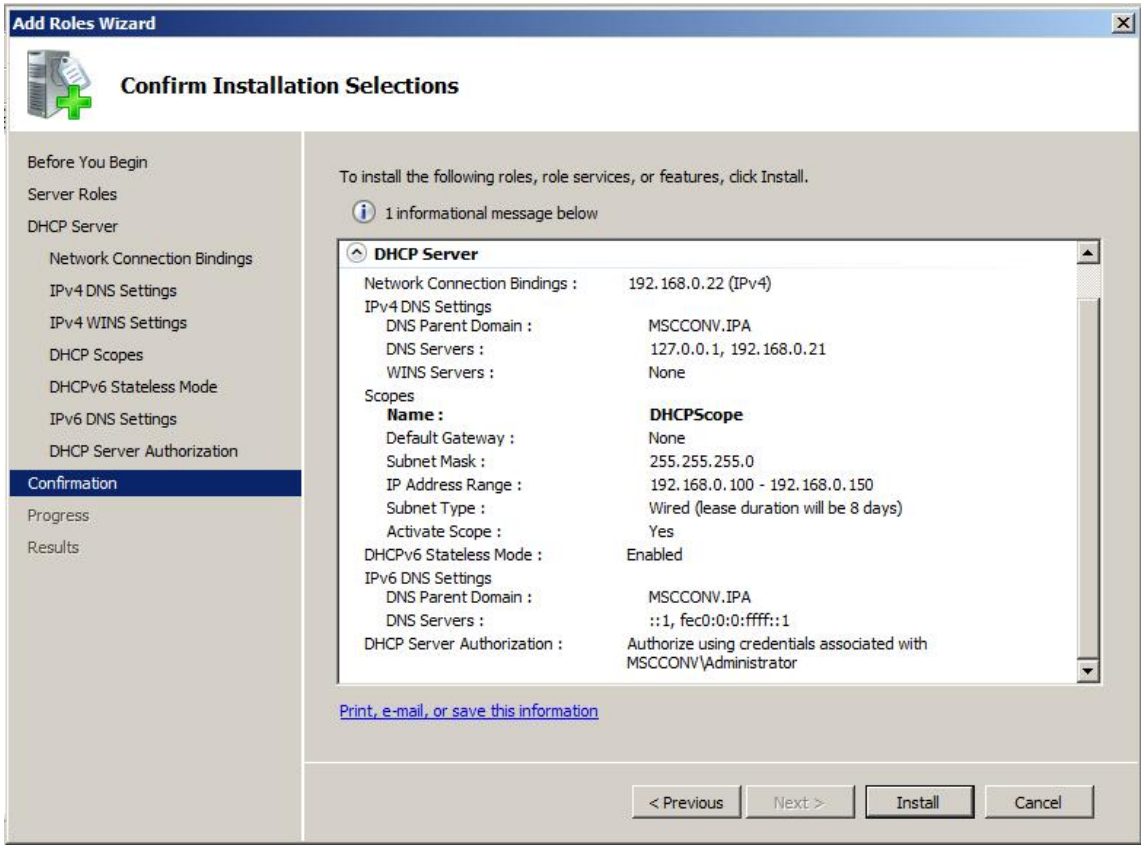
We then specify the IPv6 DNS settings as necessary and click Next.


Add Roles Wizard
Specify IPv6 DNS Server Settings
Before You Begin
Server Roles
DHCP Server
Network Connection Bindings
IPv4 DNS Settings
IPv4 WINS Settings
DHCP Scopes
DHCPv6 Stateless Mode
IPv6 DNS Settings
DHCP Server Authorization
Confirmation
Progress
Results
When clients obtain an IP address from the DHCP server, they can be given DHCP options such as the IP addresses of DNS servers and the parent domain name. The settings you provide here will be applied to clients using IPv6.
Specify the name of the parent domain that clients will use for name resolution. This domain will be used for all scopes you create on this stateless IPv6 DHCP server.
Parent domain:
MSCCONV.IPA
Specify the IP addresses of the DNS servers that clients will use for name resolution. These DNS servers will be used for all scopes you create on this DHCP server.
Preferred DNS server IPv6 address:
::1
Validate
Alternate DNS server IPv6 address:
fec0:0:0:ffff::1
Validate
More about DNS server settings
< Previous
Next >
Install
Cancel

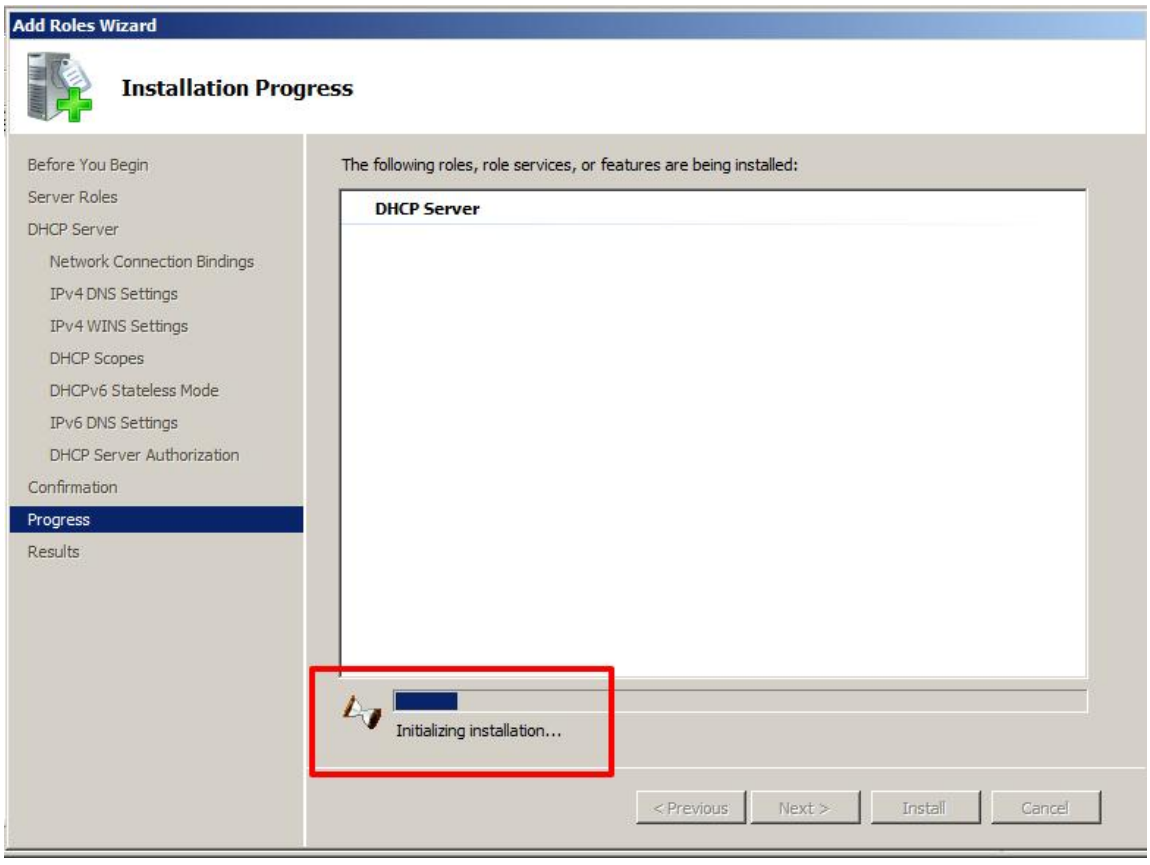
We then authorise the DHCP server by selecting Use Current Credentials and click Next.

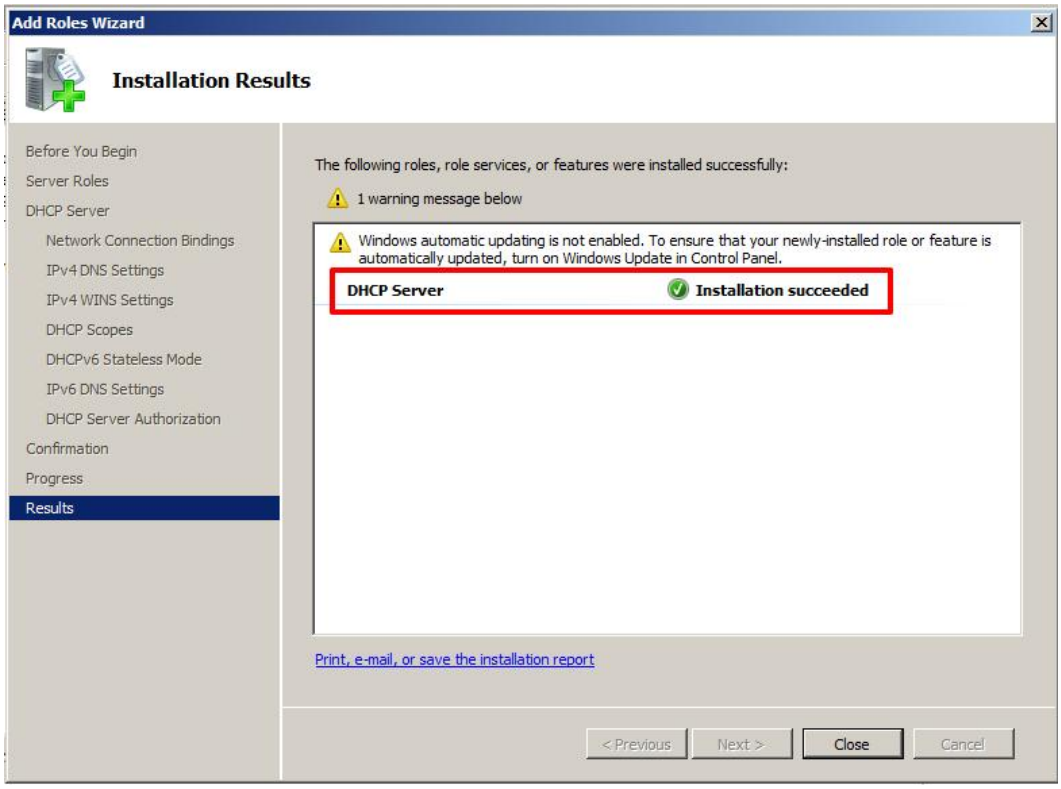

Add Roles Wizard
Authorize DHCP Server
Before You Begin
Server Roles
DHCP Server
Network Connection Bindings
IPv4 DNS Settings
IPv4 WINS Settings
DHCP Scopes
DHCPv6 Stateless Mode
IPv6 DNS Settings
DHCP Server Authorization
Confirmation
Progress
Results
Active Directory Domain Services (AD DS) stores a list of DHCP servers that are authorized to service clients on the network. Authorizing DHCP servers helps avoid accidental damage caused by running DHCP servers with incorrect configurations or DHCP servers with correct configurations on the wrong network.
Specify credentials to use for authorizing this DHCP server in AD DS.
Use current credentials
The credentials of the current user will be used to authorize this DHCP server in AD DS.
User Name:
MSCCONV\Administrator
Use alternate credentials
Specify domain administrator credentials for authorizing this DHCP server in AD DS.
User Name:
Specify...
Skip authorization of this DHCP server in AD DS
This DHCP server must be authorized in AD DS before it can service clients.
More about authorizing DHCP servers in AD DS
< Previous
Next >
Install
Cancel

We are then provided with a summary of roles, role services and features which will be installed. We click Install.

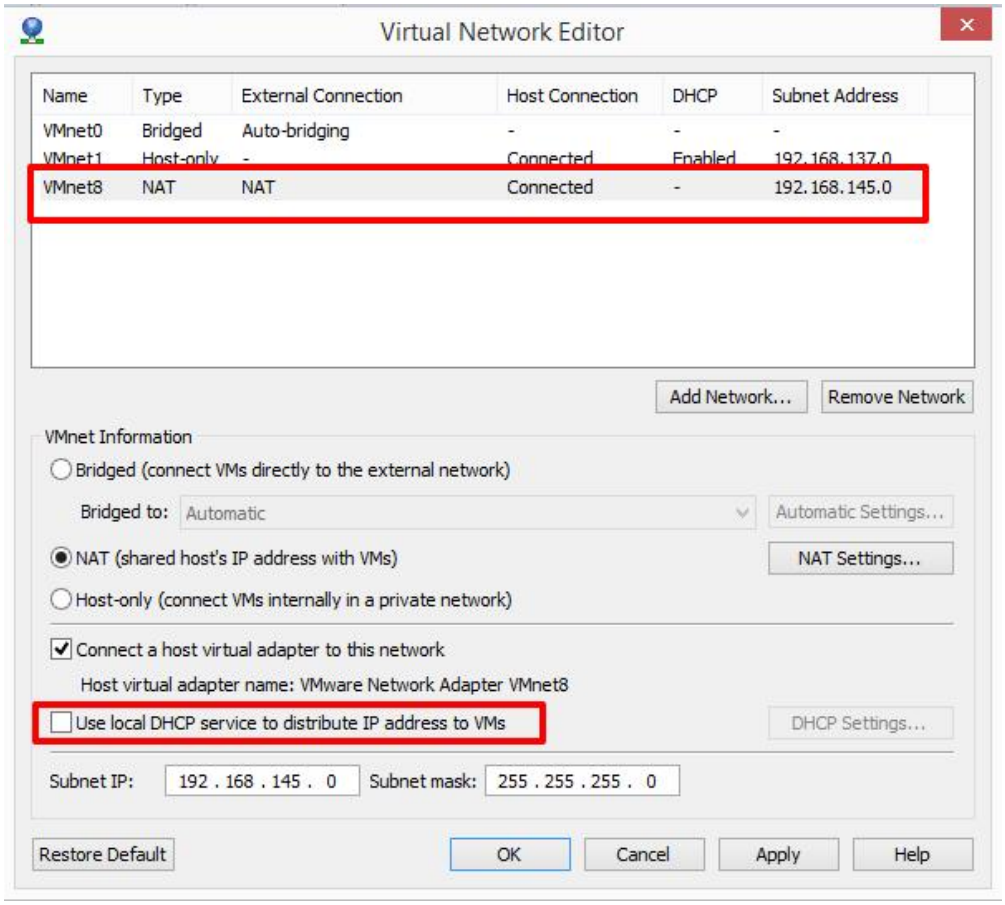


Once the installation of the DHCP Server role has completed we click Close.



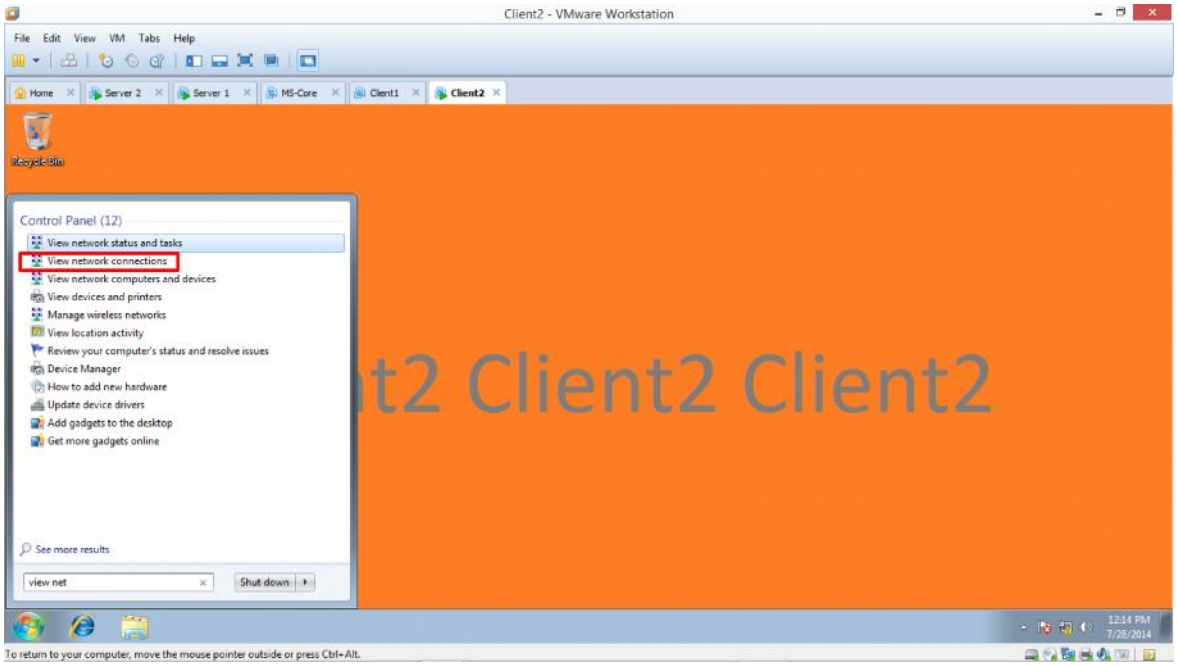


As we are using virtual machines for the purpose of illustrating this user manual, in order for the DHCP server to work, DHCP must be disabled within VMware. In order to do this, we click Edit from the VMWare dropdown menu, and then select Virtual Network Editor. We then select the NAT external connection and untick the box beside Use local DHCP service to distribute IP address to VMs, and then click OK.

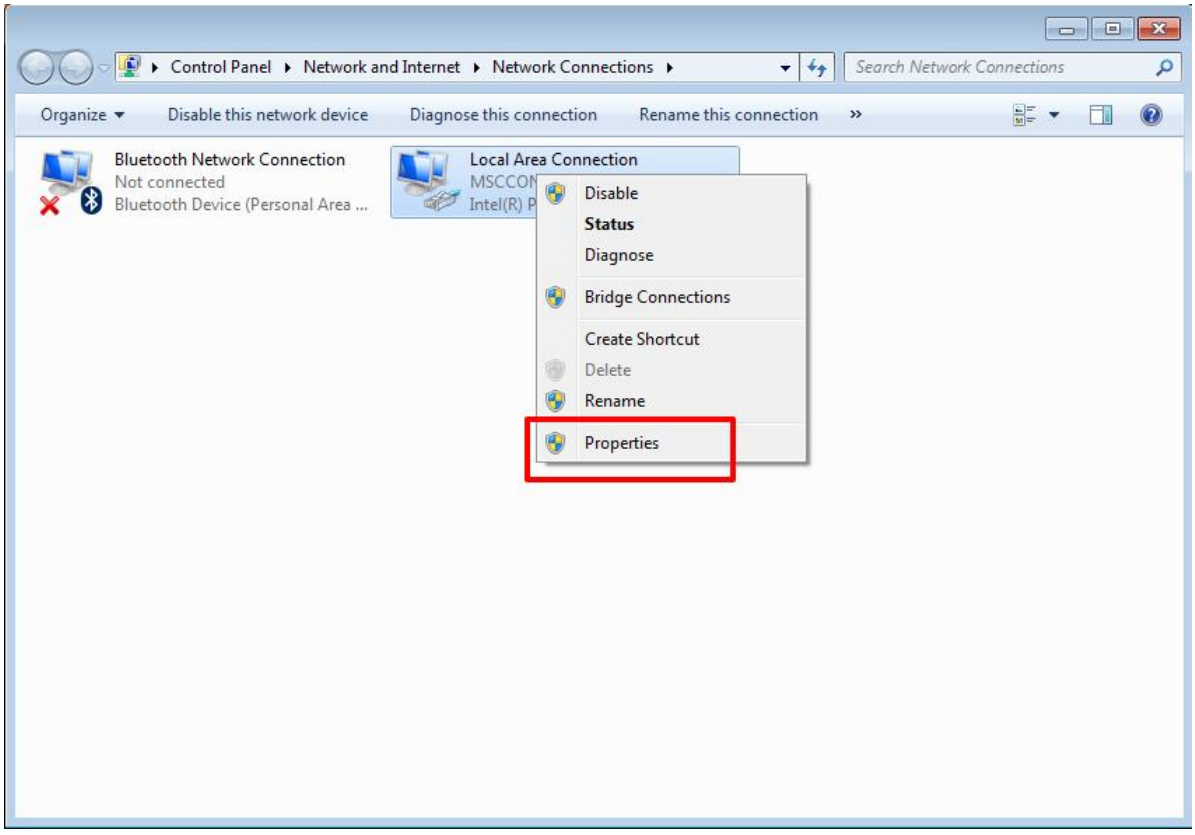


10.2.2 Subtask 2 - Configure Client2 to obtain address & TCP/IP settings from DHCP

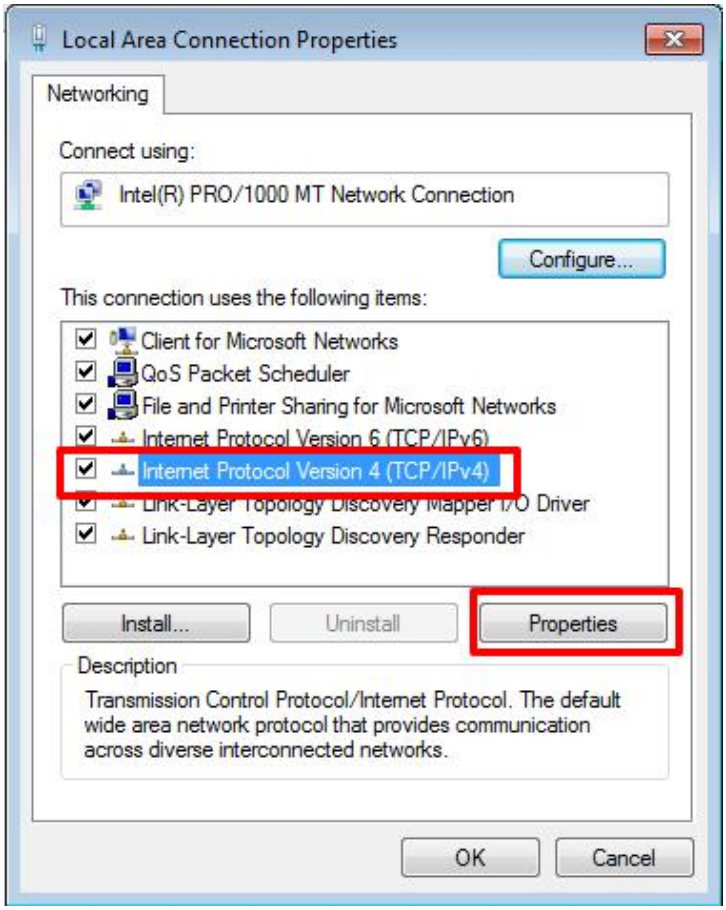
The first step in connecting the client computer to the DHCP server is to enable DHCP in the client2 network connections as opposed to the static IP address which we previously configured. From the client2 machine we click Start and search for view network connections, and open View network connections.



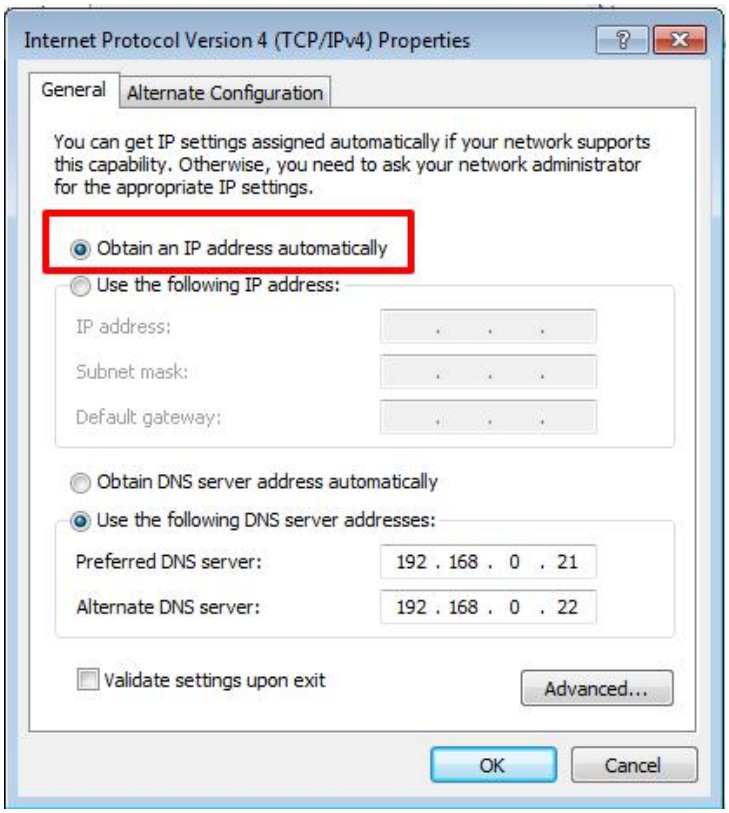
We right click on our Local Area Connection network and click Properties.



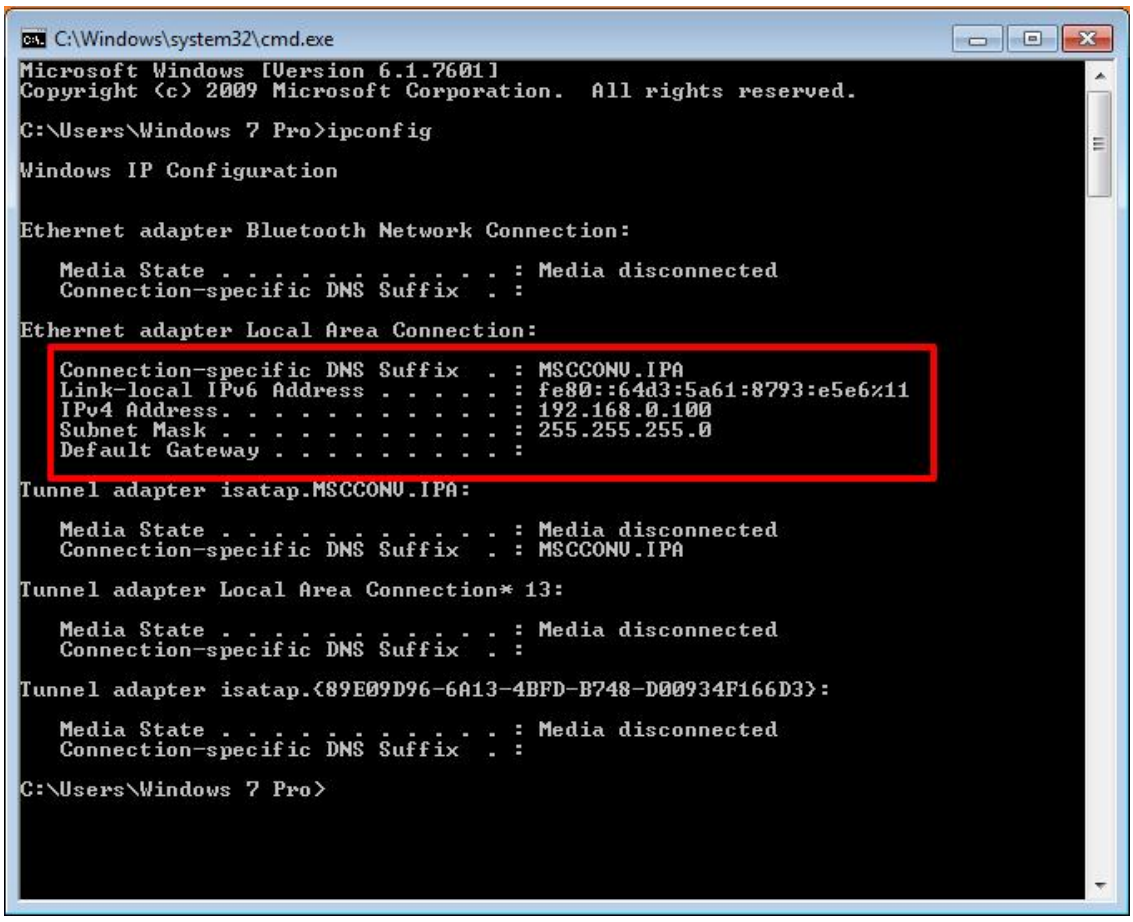
We can then click on TCP/IPv4 and select Properties.



We thin select the Obtain an IP address automatically radio button, and click OK.

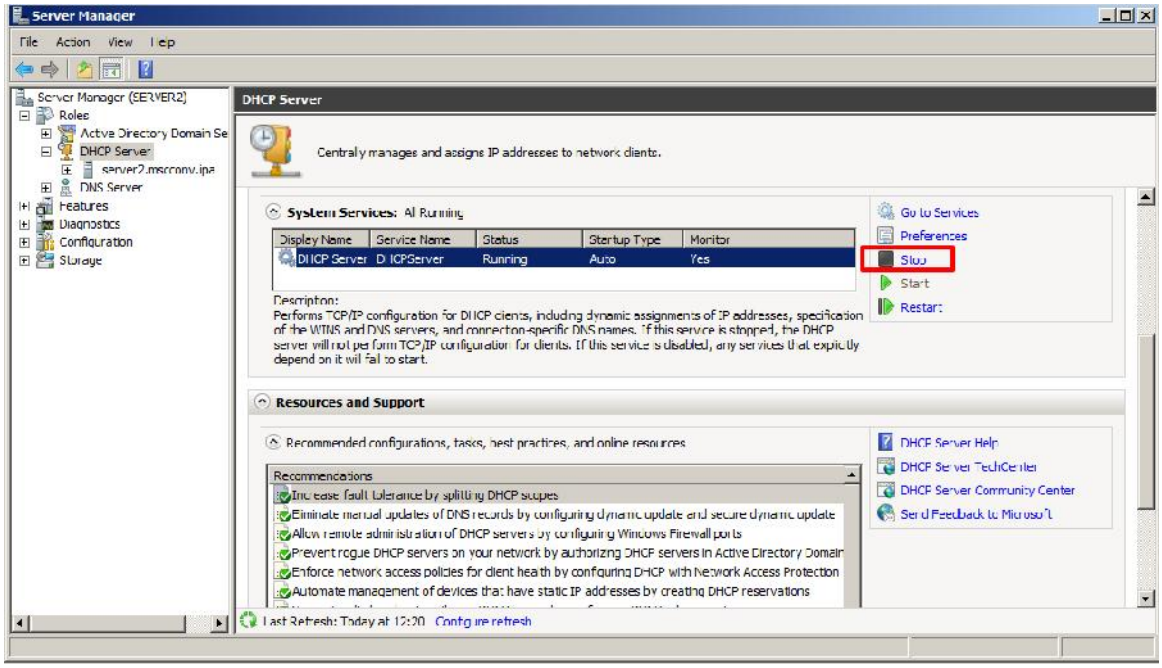

Internet Protocol Version 4 (TCP/IPv4) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 192 . 168 . 0 . 21
Alternate DNS server: 192 . 168 . 0 . 22
Validate settings upon exit
Advanced...
OK
Cancel

The computer then reconnects to the network using the new settings, and if we open the command prompt and type 'ipconfig' we can see that Client2 has now been assigned an IP address within the scope of addresses that we specified for the DHCP server.

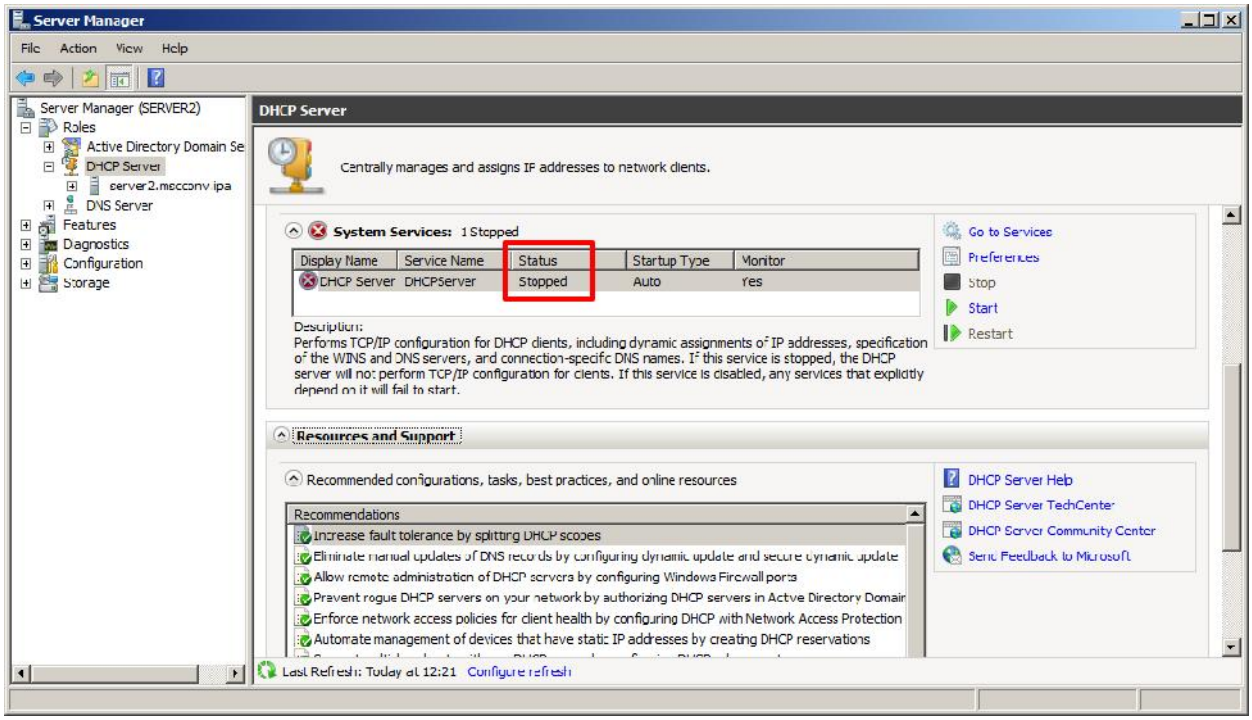

C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Windows 7 Pro>ipconfig
Windows IP Configuration
Ethernet adapter Bluetooth Network Connection:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . : MSCCONV.IPA
Link-local IPv6 Address . . . . . : fe80::64d3:5a61:8793:e5e6%11
IPv4 Address. . . . . : 192.168.0.100
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
Tunnel adapter isatap.MSCCONV.IPA:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : MSCCONV.IPA
Tunnel adapter Local Area Connection* 13:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Tunnel adapter isatap.{89E09D96-6A13-4BFD-B748-D00934F166D3}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
C:\Users\Windows 7 Pro>

10.2.3 Subtask 3 - Disable DHCP Services & Confirm Address Assigned to Client2

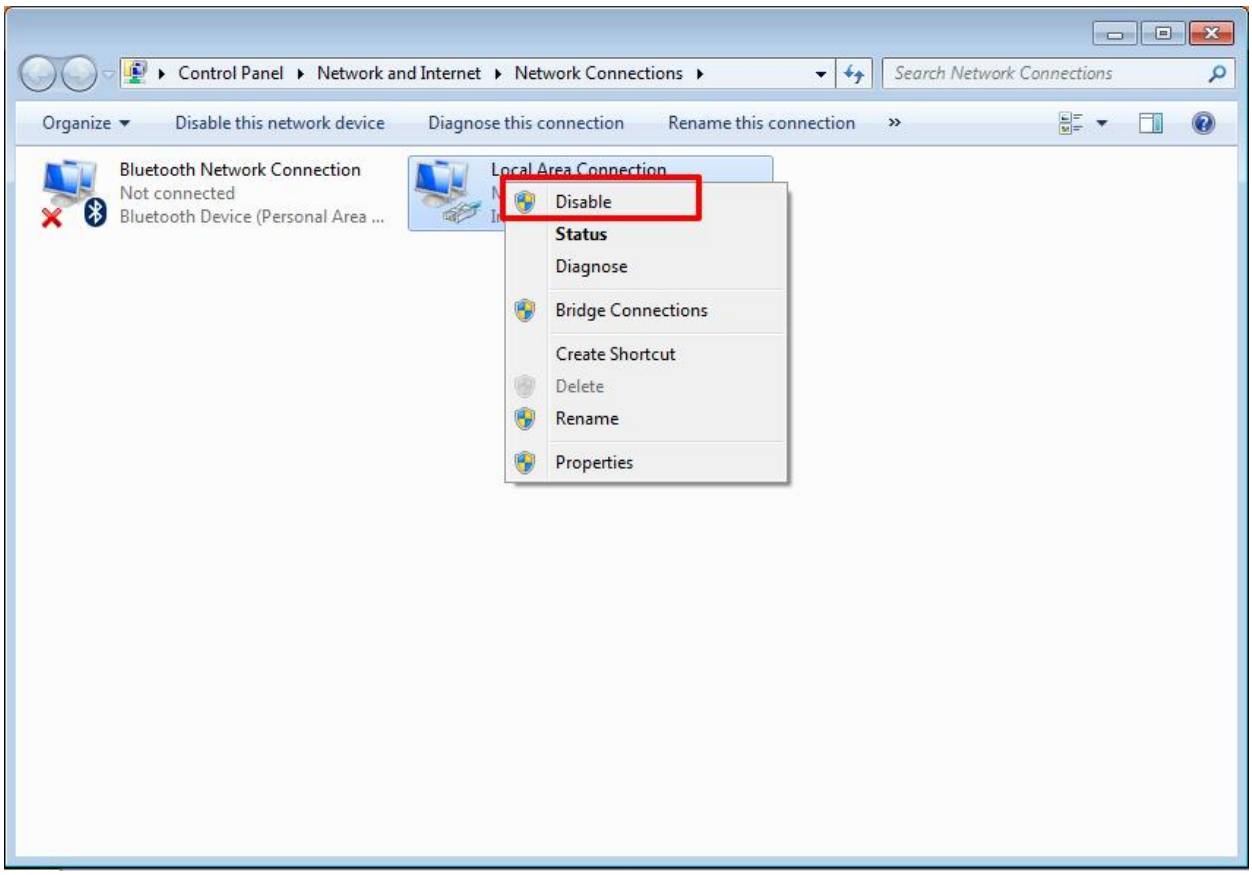
To disable DHCP services we open Server Manager on the Server2 machine and click on DHCP Server, and then in the System Services pane, we select the DHCP Server, and click Stop.

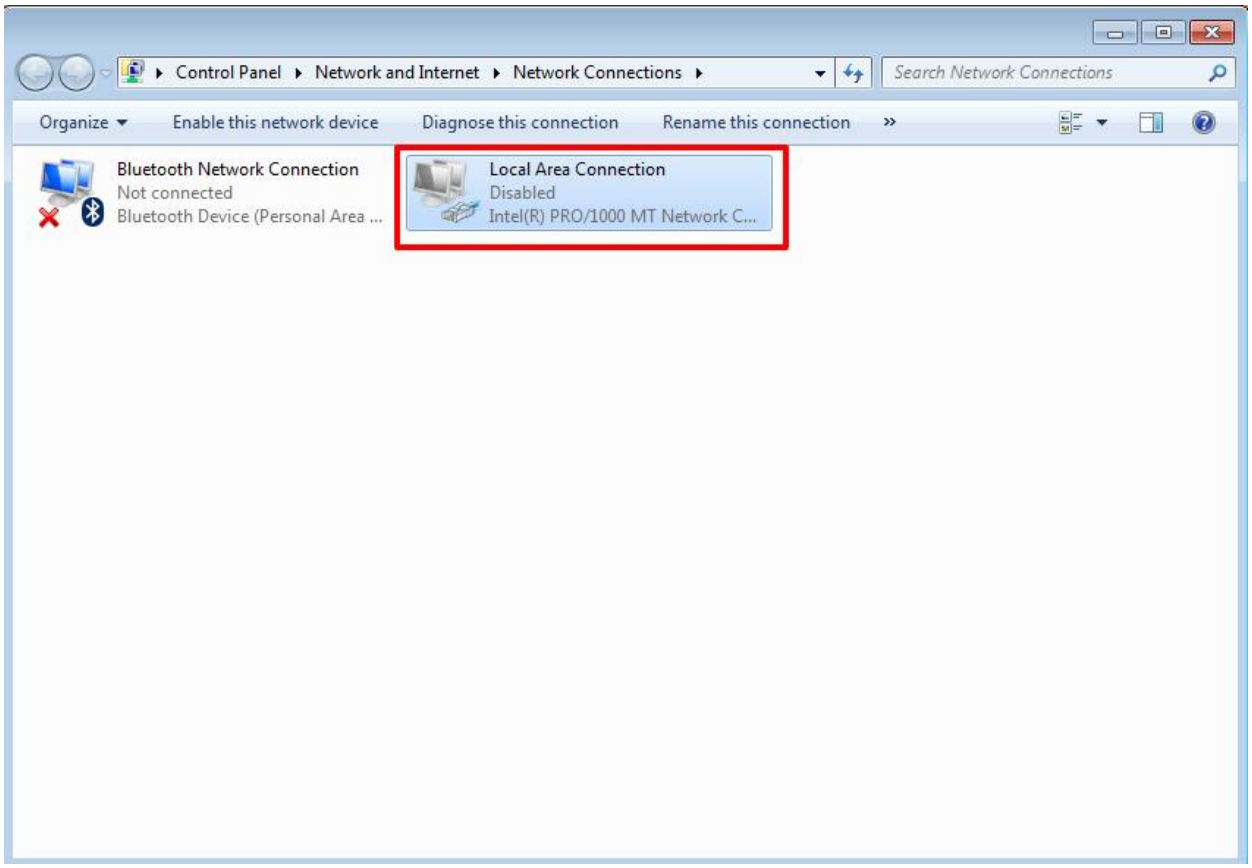

Server Manager
File Action View Help
Server Manager (SERVER2)
Roles
Active Directory Domain Se
DHCP Server
server2.mscconv.ipa
DNS Server
Features
Diagnostics
Configuration
Storage
DHCP Server
Centrally manages and assigns IP addresses to network clients.
System Services: All Running
Display Name
Service Name
Status
Startup Type
Monitor
DHCP Server
DHCPServer
Running
Auto
Yes
Go to Services
Preferences
Stop
Start
Restart
Description:
Performs TCP/IP configuration for DHCP clients, including dynamic assignments of IP addresses, specification of the WINS and DNS servers, and connection-specific DNS names. If this service is stopped, the DHCP server will not perform TCP/IP configuration for clients. If this service is disabled, any services that explicitly depend on it will fail to start.
Resources and Support
Recommended configurations, tasks, best practices, and online resources
DHCP Server Help
DHCP Server Community Center
Send Feedback to Microsoft
Recommendations
Increase fault tolerance by splitting DHCP scopes
Eliminate manual updates of DNS records by configuring dynamic update and secure dynamic update
Prevent rogue DHCP servers on your network by authorizing DHCP servers in Active Directory Domain
Enforce network access policies for client health by configuring DHCP with Network Access Protection
Automate management of devices that have static IP addresses by creating DHCP reservations

We can then see that the DHCP Server has stopped.

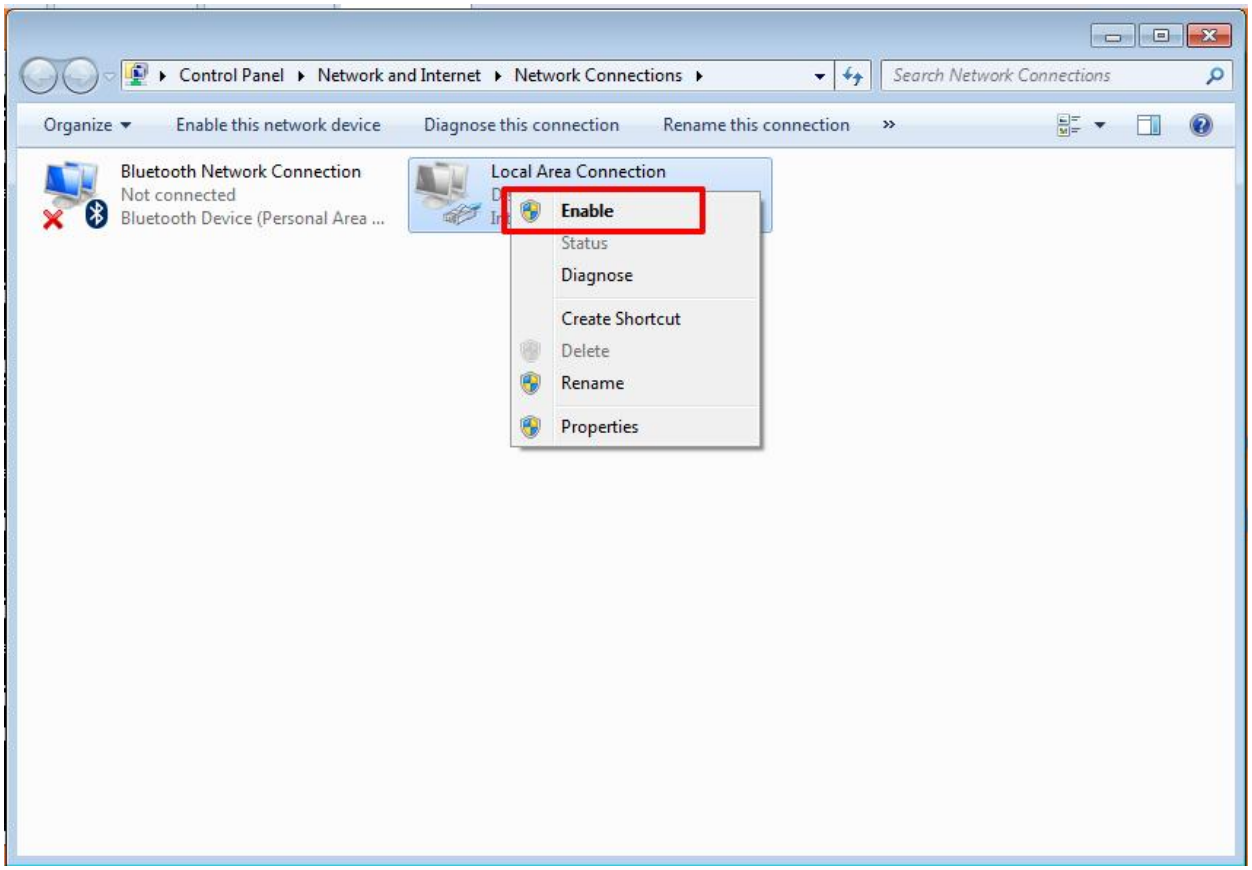

Server Manager
File Action View Help
Server Manager (SERVER2)
Roles
Active Directory Domain Se
DHCP Server
server2.mcconv.ipa
DNS Server
Features
Diagnostics
Configuration
Storage
DHCP Server
Centrally manages and assigns IP addresses to network clients.
System Services: 1 Stopped
Display Name
Service Name
Status
Startup Type
Monitor
DHCP Server
DHCPServer
Stopped
Auto
Yes
Go to Services
Preferences
Stop
Start
Restart
Description:
Performs TCP/IP configuration for DHCP clients, including dynamic assignments of IP addresses, specification of the WINS and DNS servers, and connection-specific DNS names. If this service is stopped, the DHCP server will not perform TCP/IP configuration for clients. If this service is disabled, any services that explicitly depend on it will fail to start.
Resources and Support
Recommended configurations, tasks, best practices, and online resources
Recommendations
Increase fault tolerance by splitting DHCP scopes
Allow remote administration of DHCP servers by configuring Windows Firewall ports
Prevent rogue DHCP servers on your network by authorizing DHCP servers in Active Directory Domain
Enforce network access policies for client health by configuring DHCP with Network Access Protection
Automate management of devices that have static IP addresses by creating DHCP reservations
DHCP Server Help
DHCP Server TechCenter
DHCP Server Community Center
Last Refresh: Today at 12:21 Configure refresh

We then open the Network Connections window on Client2, right click on our network and click Disable.



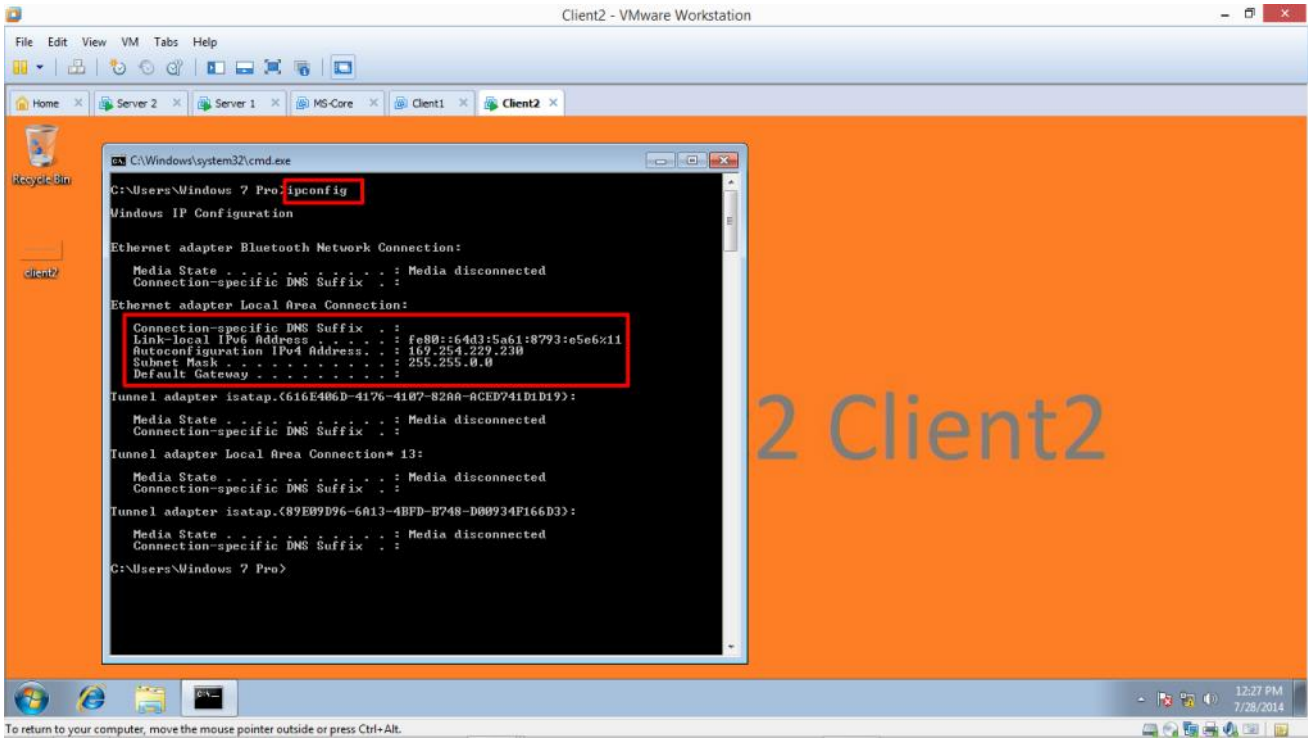


We then reconnect to the network again by right clicking on the network and selecting Enable.



The DHCP service is not running, therefore Client2 will not be automatically assigned an IP address and will not be able to communicate with the network as before. Client2 also has not been statically assigned an IP address. Therefore, the system will assign itself an Automatic Private IP Addressing (APIPA) address beginning with 169.254.

From the Client2 command line we type 'ipconfig' and we can see that when we disable DHCP services, Client2 is assigned an APIPA address, which is an address that is given out when DHCP fails. Once DHCP is enabled again, an IP address within the DHCP scope will be assigned automatically as before.


Client2 - VMware Workstation
File Edit View VM Tabs Help
Home
Server 2
Server 1
MS-Core
Client1
Client2
Recycle Bin
client2
C:\Windows\system32\cmd.exe
C:\Users\Windows 7 Pro>ipconfig
Windows IP Configuration
Ethernet adapter Bluetooth Network Connection:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::64d3:5a61:8793:e5e6x11
Autoconfiguration IPv4 Address. . : 169.254.229.230
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . . :
Tunnel adapter isatap.{616E406D-4176-4107-82A8-ACED741D1D19}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Tunnel adapter Local Area Connection* 13:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Tunnel adapter isatap.{89E09D96-6A13-4BFD-B748-D80934F166D3}:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
C:\Users\Windows 7 Pro>
2 Client2
12:27 PM
7/28/2014
To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

11. Part B - Task H

- *Decommission Server 2 from the Active Directory system using a method which would be used if the server became unbootable.*

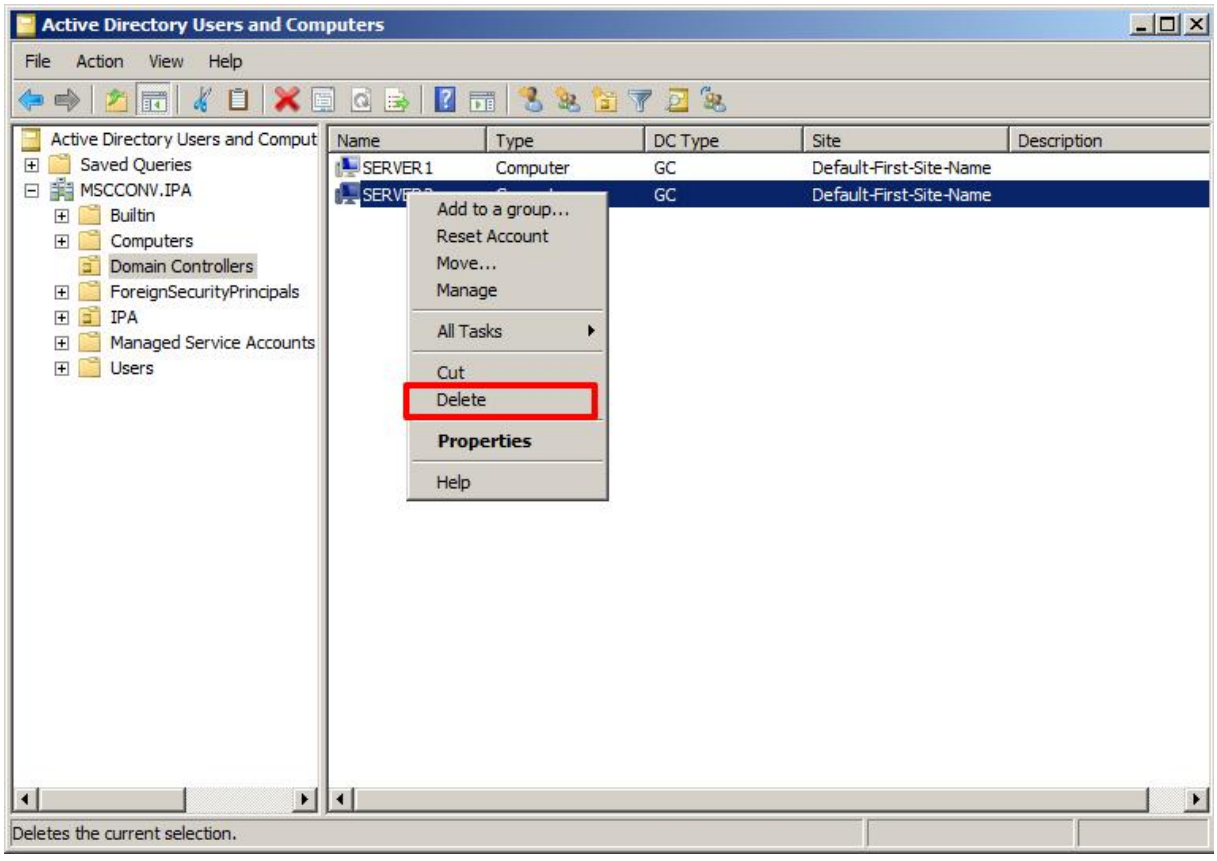
11.1 Preamble

If a domain controller becomes unbootable or is disposed of, it is then necessary to remove the system from Active Directory. In normal circumstances, a domain controller is removed from Active Directory by running DCPROMO directly from the domain controller server. However, this user manual describes a scenario where the system is unbootable, and so the the system is removed via Server1. If, however, Server2 were to ever becomes bootable again it would not be possible to remove Active Directory using DCPROMO, and so an alternative method which involves using the /forceremoval command in the command prompt is also described below.

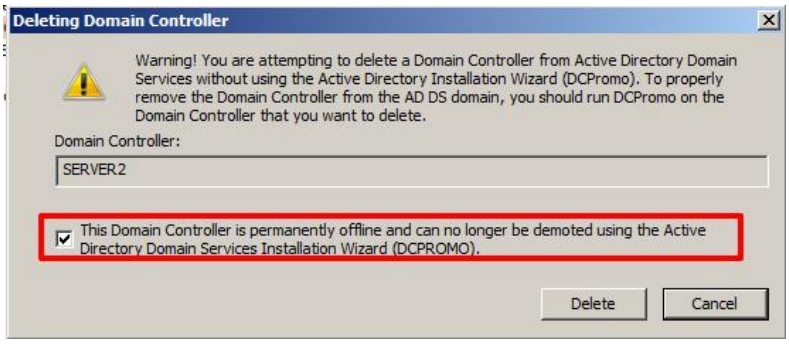
11.2 Procedure

11.2.1 Subtask 1 - Decommissioning Server2 from the Active Directory

If a server has become unbootable, it is possible to delete a domain controller through Active Directory Users and Computers. On Server1, within AD UC, we select Domain Controllers under the domain, select the DC that we want to delete, and then right-click it and select Delete.



A warning message is then displayed advising that the best method to delete a domain controller is by using DCPROMO. As we are theoretically dealing with a server that is unbootable, this is the only method you have of deleting the domain controller from the domain. We tick the checkbox for This Domain Controller is permanently offline and can no longer be demoted using the Active Directory Domain Services Installation Wizard (DCPROMO), and then click Delete

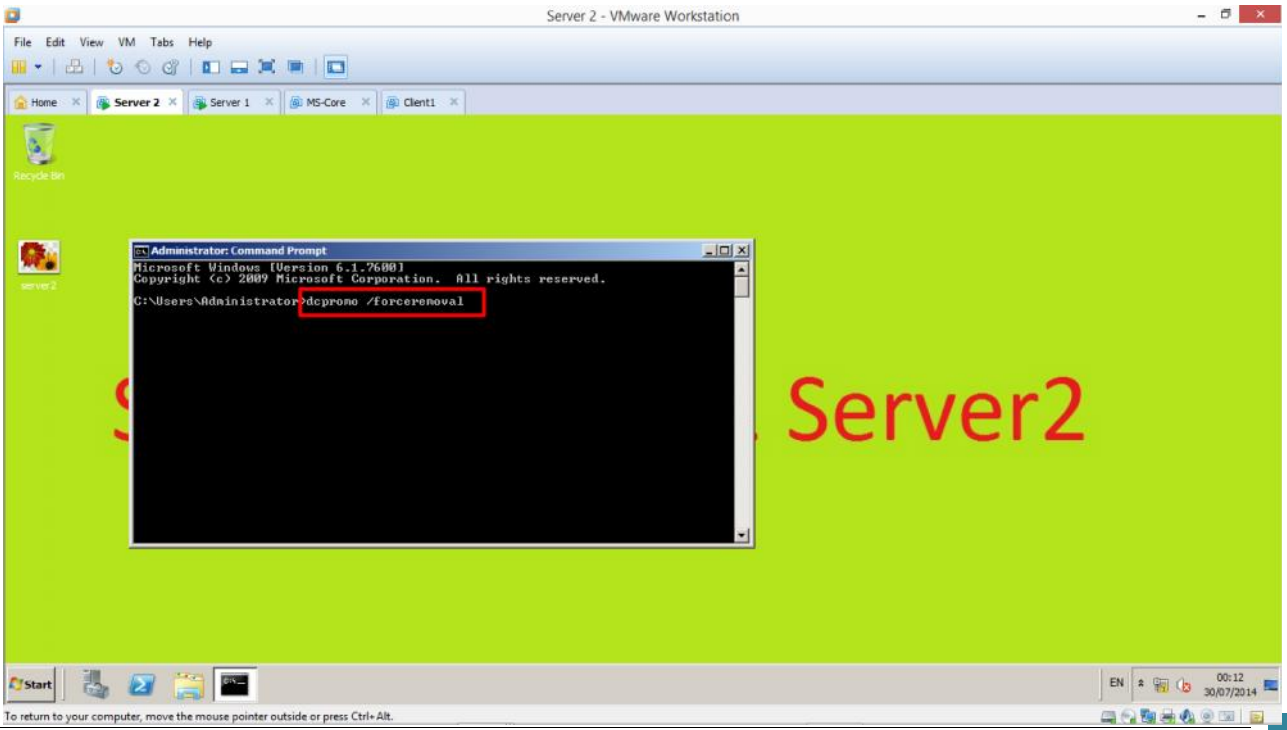

Deleting Domain Controller
Warning! You are attempting to delete a Domain Controller from Active Directory Domain Services without using the Active Directory Installation Wizard (DCPromo). To properly remove the Domain Controller from the AD DS domain, you should run DCPromo on the Domain Controller that you want to delete.
Domain Controller:
SERVER2
This Domain Controller is permanently offline and can no longer be demoted using the Active Directory Domain Services Installation Wizard (DCPROMO).
Delete
Cancel

We finally click Yes at the warning that the domain controller is a global catalog, and this completes the deletion of the domain controller from our domain.

Delete Domain Controller
This Active Directory Domain Controller is a global catalog.
Do you want to continue with this deletion?
Yes
No

11.2.2 Subtask 2 - Deleting Domain Controller using dcpromo if Server is Bootable

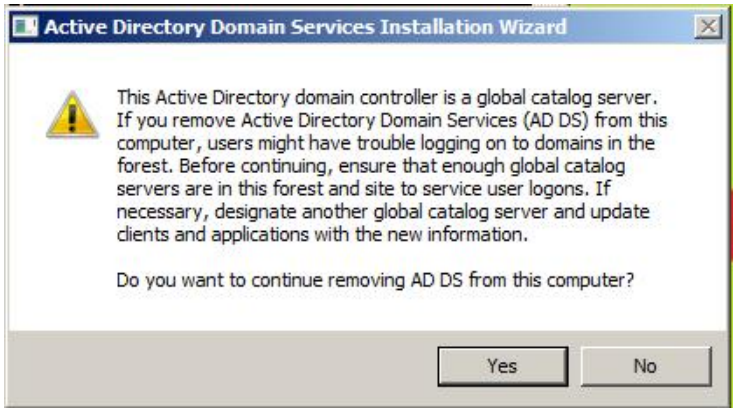
If the previously unbootable server becomes bootable again, we would use the 'dcpromo /forceremoval' command from the command prompt.



A warning message is generated warning that data is about to be deleted that may not be recoverable, and we click Yes to continue.

Active Directory Domain Services Installation Wizard
This Active Directory domain controller is a DNS server. If you remove Active Directory Domain Services (AD DS) from this computer, all of the DNS data that is stored in Active Directory-integrated zones will be lost. After you remove AD DS from this server, this DNS server will not be able to perform name resolution for the DNS zones that were Active Directory-integrated. Therefore, we recommend that you update the DNS configuration of all computers that currently refer to the IP address of this DNS server for name resolution with the IP address of a new DNS server.
Do you want to continue removing AD DS from this computer?
Yes
No

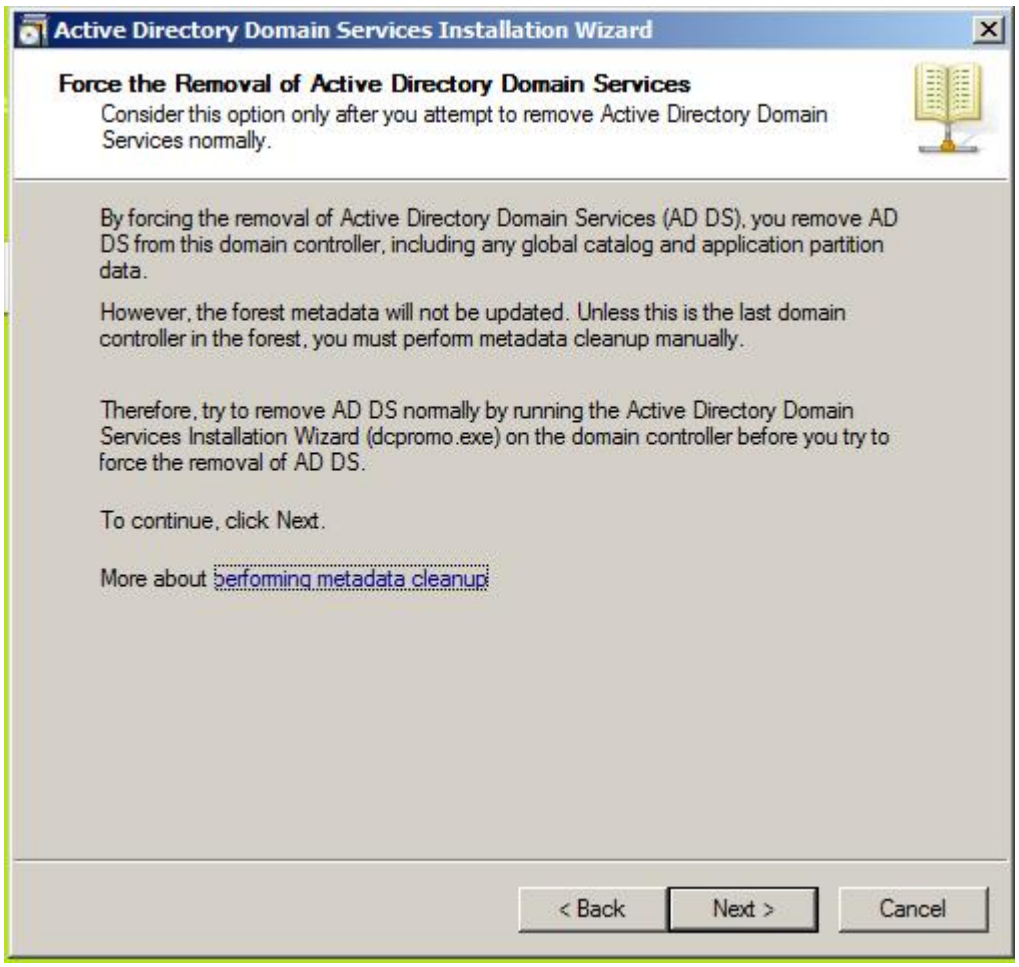
As the DC is a global catalog server, another warning message advises that we may need to provide another server if we want the domain to continue servicing all of the computers on the domain, at which we again click Yes to continue.


Active Directory Domain Services Installation Wizard
This Active Directory domain controller is a global catalog server. If you remove Active Directory Domain Services (AD DS) from this computer, users might have trouble logging on to domains in the forest. Before continuing, ensure that enough global catalog servers are in this forest and site to service user logons. If necessary, designate another global catalog server and update clients and applications with the new information.
Do you want to continue removing AD DS from this computer?
Yes
No

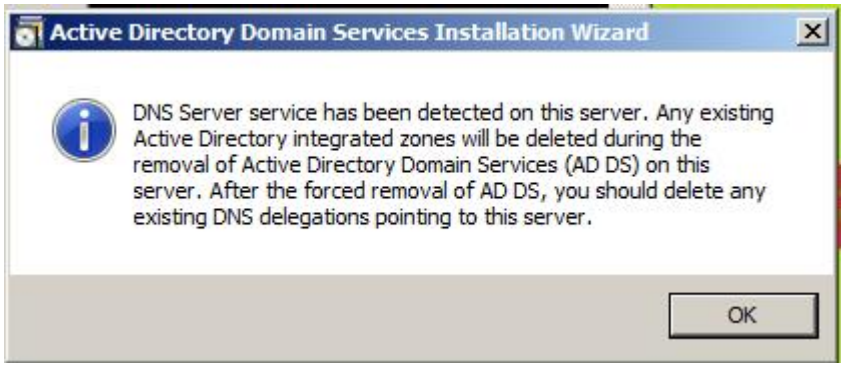
We then follow the wizard that is opened.

Active Directory Domain Services Installation Wizard
Welcome to the Active Directory Domain Services Installation Wizard
This computer is already an Active Directory domain controller. You can use this wizard to uninstall Active Directory Domain Services on this server.
More about Active Directory Domain Services
< Back
Next >
Cancel

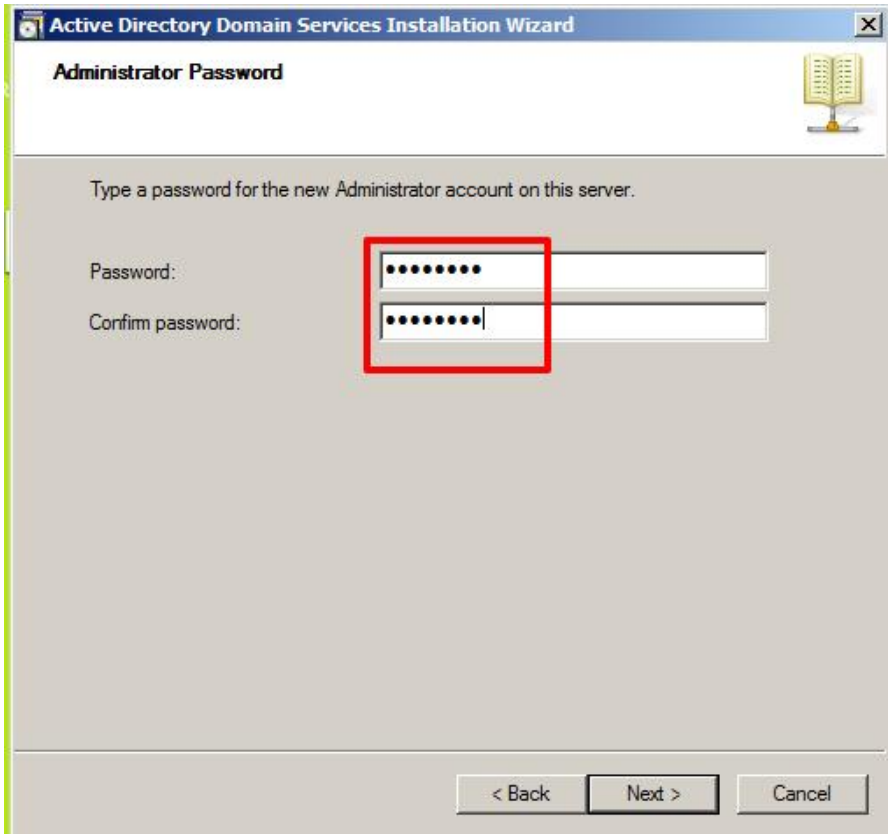
The next window advises that it would be better to uninstall AD DS on the server while connected to the domain instead of forcefully removing it. As we have already deleted the domain controller this is not an option, and we click Next.


Active Directory Domain Services Installation Wizard
Force the Removal of Active Directory Domain Services
Consider this option only after you attempt to remove Active Directory Domain Services normally.
By forcing the removal of Active Directory Domain Services (AD DS), you remove AD DS from this domain controller, including any global catalog and application partition data.
However, the forest metadata will not be updated. Unless this is the last domain controller in the forest, you must perform metadata cleanup manually.
Therefore, try to remove AD DS normally by running the Active Directory Domain Services Installation Wizard (dcpromo.exe) on the domain controller before you try to force the removal of AD DS.
To continue, click Next.
More about performing metadata cleanup
< Back
Next >
Cancel

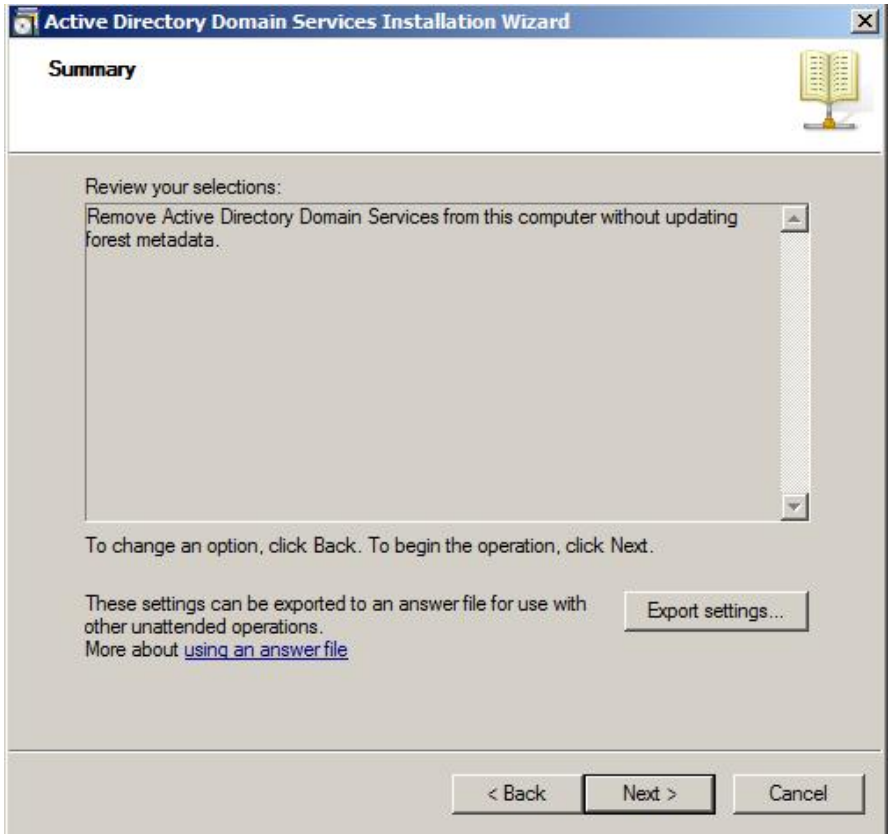
The next window warns to update or delete any existing DNS delegations pointing to this server.


Active Directory Domain Services Installation Wizard
DNS Server service has been detected on this server. Any existing Active Directory integrated zones will be deleted during the removal of Active Directory Domain Services (AD DS) on this server. After the forced removal of AD DS, you should delete any existing DNS delegations pointing to this server.
OK

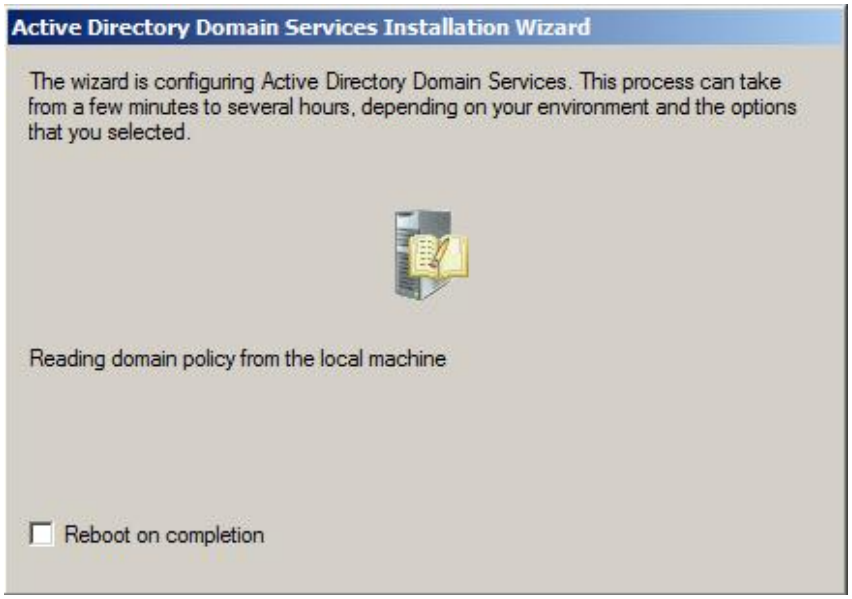
We are then prompted to provide an administrator password that will be used for the new local account that will be configured on the server.



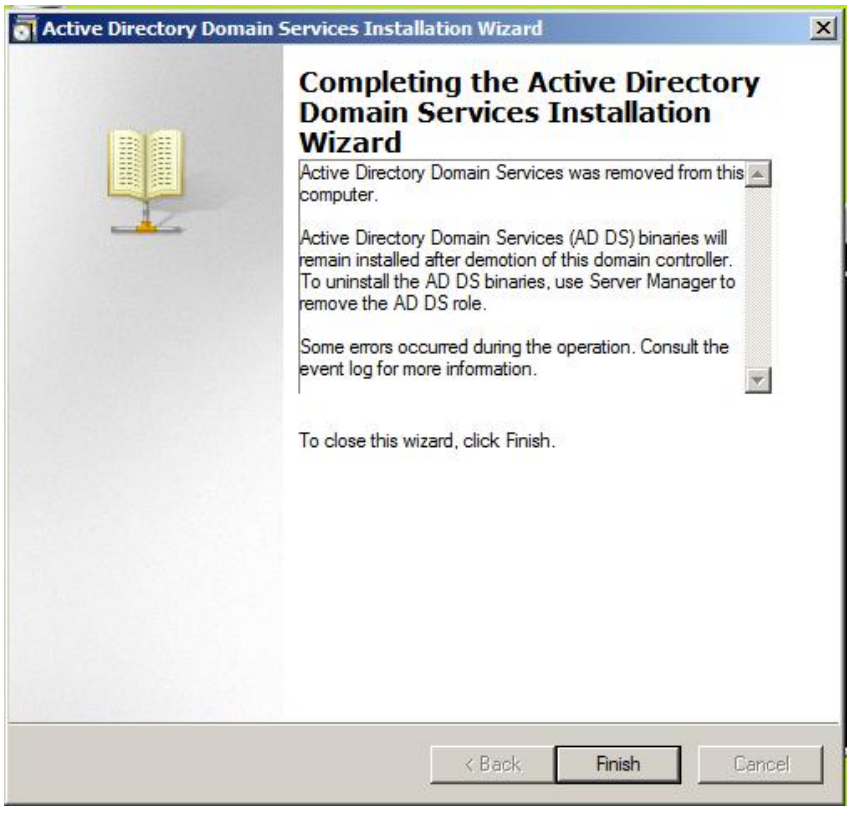
The next window provides the option to export the forest metadata in an answer file.


Active Directory Domain Services Installation Wizard
Summary
Review your selections:
Remove Active Directory Domain Services from this computer without updating forest metadata.
To change an option, click Back. To begin the operation, click Next.
These settings can be exported to an answer file for use with other unattended operations.
More about using an answer file
Export settings...
< Back
Next >
Cancel

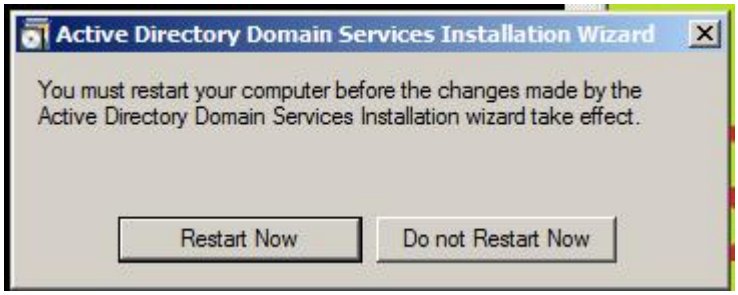
Active Directory Domain Services is then removed from the computer.


Active Directory Domain Services Installation Wizard
The wizard is configuring Active Directory Domain Services. This process can take from a few minutes to several hours, depending on your environment and the options that you selected.
Reading domain policy from the local machine
Reboot on completion

We click Finish to complete the wizard.


Active Directory Domain Services Installation Wizard
Completing the Active Directory Domain Services Installation Wizard
Active Directory Domain Services was removed from this computer.
Active Directory Domain Services (AD DS) binaries will remain installed after demotion of this domain controller. To uninstall the AD DS binaries, use Server Manager to remove the AD DS role.
Some errors occurred during the operation. Consult the event log for more information.
To close this wizard, click Finish.
< Back
Finish
Cancel

It is necessary to restart the computer the effect the above changes.


Active Directory Domain Services Installation Wizard
You must restart your computer before the changes made by the Active Directory Domain Services Installation wizard take effect.
Restart Now
Do not Restart Now

When the computer restarts we can see that the computer is no longer part of our domain, and we can now log on as a local user.

Appendix A - References

[1] http://technet.microsoft.com/en-us/library/dd349348(v=ws.10).aspx. Accessed July 1, 2014.

[2] http://go.microsoft.com/fwlink/?LinkId=136976. Accessed July 1, 2014.

[3] http://go.microsoft.com/fwlink/?LinkId=136976. Accessed July 1, 2014.

[4] http://www.slysoft.com/en/download.html. Accessed July 1, 2014.

[5] T.Brett, Introduction to Active Directory Services, June 10 , 2014.

[6] http://msdn.microsoft.com/en-us/library/dd184075.aspx. Accessed July 17, 2014.

[7] T.Brett, IP Addressing / CIDR, July 8, 2014.

[8] http://technet.microsoft.com/en-us/library/dd379511(v=ws.10).aspx. Accessed July 17, 2014.

[9] http://windows.microsoft.com/en-IE/windows7/products/system-requirements. Accessed July 17, 2014.

[10] http://www.techopedia.com/definition/4193/domain-controller. Accessed July 18, 2014.

[11] http://technet.microsoft.com/en-us/library/cc738032(v=ws.10).aspx. Accessed July 18, 2014.

[12] http://msdn.microsoft.com/en-us/library/aa362244(v=vs.85).aspx. Accessed July 18, 2014.

[13] Arpaci-Dusseau, R. H., & Arpaci-Dusseau, A. C. (2012). Operating Systems: Three Easy Pieces.

[14] http://technet.microsoft.com/en-us/library/cc772180.aspx. Accessed July 19, 2014.

[15] http://www.microsoft.com/en-ie/download/details.aspx?id=23476. Accessed July 19, 2014.

[16] http://support.microsoft.com/kb/225551. Accessed July 19, 2014.

[17] http://technet.microsoft.com/en-us/library/hh831484.aspx. Accessed July 19, 2014.

[18] T.Brett, Introduction to Active Directory Services, June 10 , 2014.

[19] http://windowsitpro.com/security/access-denied-understand-difference-between-ad-ous-and-groups. Accessed July 20, 2014.

[20] T.Brett, Group Policy, July 1 , 2014.

[21] http://technet.microsoft.com/en-us/library/cc732524.aspx. Accessed July 10, 2014.

[22] http://technet.microsoft.com/en-us/library/cc770842(v=ws.10).aspx. Accessed July 16, 2014.

[23] http://technet.microsoft.com/en-us/library/cc784090(v=ws.10).aspx. Accessed July 16, 2014.

[24] http://en.wikipedia.org/wiki/File_server. Accessed July 20, 2014.

Appendix B - Assignment Details - Part A

INSTITUTE OF PUBLIC ADMINISTRATION
MSc in Computer Science
Systems Management
Module Assignment 2014 Part A

Introduction

The purpose of this assignment is to give you a thorough understanding of operating systems management and networking through your practical knowledge and skills.
This document is Part A of a two Part Assignment, Part B will be given out at a later date, both components are to be submitted together as a single assignment in one document with Part A and Part B clearly marked out accordingly.

For this assignment, you are asked to carry out a series of practical exercises.

It is essential that you document your steps and processes from the beginning of the assignment to the end. For each practical task, you should provide legible screen shots at each stage to show its progress and completion. These screen shots should be documented as in a professional user's manual, and such that it could be used to instruct a trainee IT administrator on how to perform the relevant tasks.

At the end of the assignment, you will be required to provide the assessor with an artefact which conforms to the following

- Artefact
  The artefact to be produced is a user's manual showing the steps which need to be taken to complete each of the relevant tasks.
  As in any user manual, for each of the tasks, all technical issues with regard to hardware and software requirements which must be met should be detailed accordingly. Screen shots should also be used to illustrate the steps throughout

- References
  Any references used should be in APA format

- Naming Convention and document type
  The document should be produced in a format which can be viewed in either Microsoft Word or Adobe Acrobat.
  The document should be saved in the following naming format
  'lastnameFirstinitial_sysmgmt.xxx' where xxx is the extension of the document used.
  If your name is John Smith, and the document is in Acrobat Reader than this document should be named as follows:

smithJ_sysmgmt.pdf

- Submission
  The artefact documentation should be provided in soft copy format only.
  The Assignment artefact is to be submitted via a dropbox link, which should be emailed to both training@tombrett.ie and ckelly@ipa.ie

- Deadline
  The deadline for the assignment submission of both parts (A and B) of this assignment is Monday 4 th August at 1600 hours.

- Penalties
  Any late submissions will be subject to a penalty of 3 marks per day accountable from the submission deadline date and time.
  Penalties will also be applied for incorrect naming and submission of the assignment accordingly

Please ensure that your name and student number is on the cover page of the documentation

Assignment Details

Task A1

Using Virtual Machines to mimic the use of Physical Machines, document and Install Microsoft Windows 7 using the Lite Touch Installation (LTI) method.

Task A2

Microsoft Windows offers the ability to enforce full drive encryption, using a Virtual Machine
Document the process of Implementing Bitlocker in the form of a user instruction manual.
During the process outline any options and or requirements which must be met in order to setup same.

Appendix C - Assignment Details - Part B

INSTITUTE OF PUBLIC ADMINISTRATION
MSc in Computer Science
Systems Management
Module Assignment 2014 Part B

Introduction

The purpose of this assignment is to give you a thorough understanding of operating systems management and networking through your practical knowledge and skills.
This is the second part of this assignment, Part A has been previously assigned earlier in the course. Please note that both parts have to be submitted together clearly labelling each component part accordingly.

In Part B, You are asked to carry out a series of practical exercises.

It is essential that you document your steps and processes from the beginning of the assignment and right to the end. For each practical task, you should provide legible screen shots at each stage to show its progress and completion. These shots should be documented as in a professional user's manual, and such that it could be used to instruct a junior domain administrator on how to achieve same.

At the end of the assignment, you will be required to provide the assessor with:

- A user's manual showing the steps taken to achieve these results.

The format and deadline date for the overall assignment submission (Parts A and B) has been previously detailed in Part A.

Assignment Details

Task A

- Using Virtual-box, VMware Workstation or similar you are to create several virtual machines:

- Three Servers with server 2008 or later installed
  - 2 of these servers are to be installed with Standard, Entreprise or Datacenter edition using the full GUI install and named Server1 and Server2 accordingly.
  - The third server is to be a Standard Server Core installation and named MS-Core

- One Client machine with Windows 7 or later installed and named Client1

- Clone this Client Virtual Machine and rename the workstation Client2

- Please use adequate sizes for the Hard Disk partitions on each of the Client machines. Configure the servers with 200 GB hard disks. For the Operating System create a partition of 60 GB accordingly.

- RAM on all machines is to be 512 MB or greater depending on your amount of available RAM

- All passwords are to be Pa$$w0rd.

- Give all machines a static IP address from the range 192.168.0.0/24.

Task B

- Please configure the following Forest settings:

- Server1 is to be a Domain Controller of a tree called MSCCONV.IPA

- Client 1 is to be a workstation member of MSCCONV.IPA

- Server2 is to be setup as a second domain controller of MSCCONV.IPA

- MS-Core is to be a member server of MSCCONV.IPA

Task C

- Install 2 additional hard disks of 150 GB, on Server1 and configure them to:

- Using these disks, use one to Mirror the operating system disk

- Using the remaining available space available, Create a Spanned volume which is to use all of the remaining free space on all disks.

Task D

- Within Active Directory, create the following organisational unit structure:

- Parent OU called IPA containing:
  - Two child OUs called Marketing and IT.
  - IT OU to contain 2 sub OUs called Dublin and Belfast.

- Identify any method of creating users via a TUI environment, outline advantages accordingly.

- Using a method of your choice, Create 5 users in the IPA OU called user1 to user10 (first name only) using the default Pa$$w0rd.

- Create 3 users in sales called user11 to user15, 3 users in Dublin called user16 to user18, and 2 users in Belfast called user19 and user20.

- Users are not to change their passwords at first login and are to have 24 hour logins enabled, Monday to Friday only.

Task E

- Group the users in each OU according to recommended security policies.

- Prevent the users in the sales OU from being able to see the IT OU in Active Directory.

- Create 3 group policies to achieve the following:

- Forward my documents from Client2 to a folder on the root of C on Server2 called User_Docs.

- Prevent Belfast from accessing control panel. Please exclude user 20 from this policy.

- Publish any MSI file of your choice from the C drive contents to all users in Dublin.

Task F

- Setup the MS-Core server as a file server

- Configure MS-Core for Windows Remote administration.

- Access MS-Core from Client2 using remote desktop

Task G

- Install DHCP on Server2 with the scope 192.168.0.100 to 192.168.0.150, default mask and appropriate DNS address. Configure Client2 to obtain its address and TCP/IP settings from DHCP.

- If you disable DHCP services, what address will Client2 get?

Task H

- Decommission Server 2 from the Active Directory system using a method which would be used if the server became unbootable.

Appendix D - Creation of a Virtual Machine & Installation of Windows 7 Pro. OS

Task A.1 - Creation of a Virtual Machine & Installation of Windows 7 Pro. OS

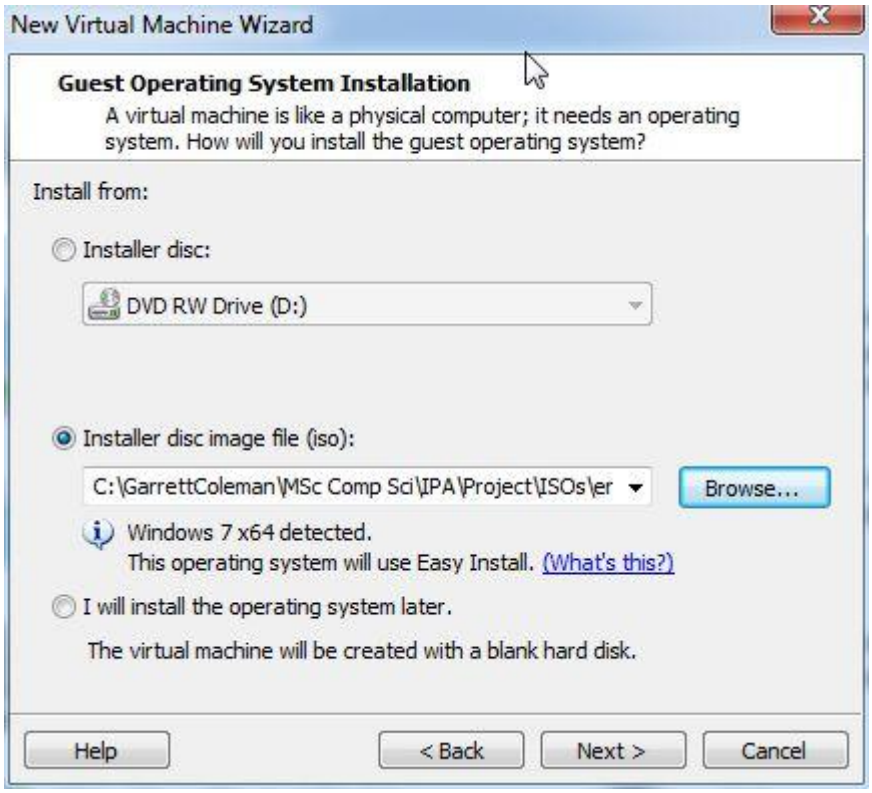
A.1.1 - Creation of Windows Virtual Machine

For the purposes of the tasks described in this manual, VMWare Workstation 9 has been used. The installation of this program is outside the scope of this manual.

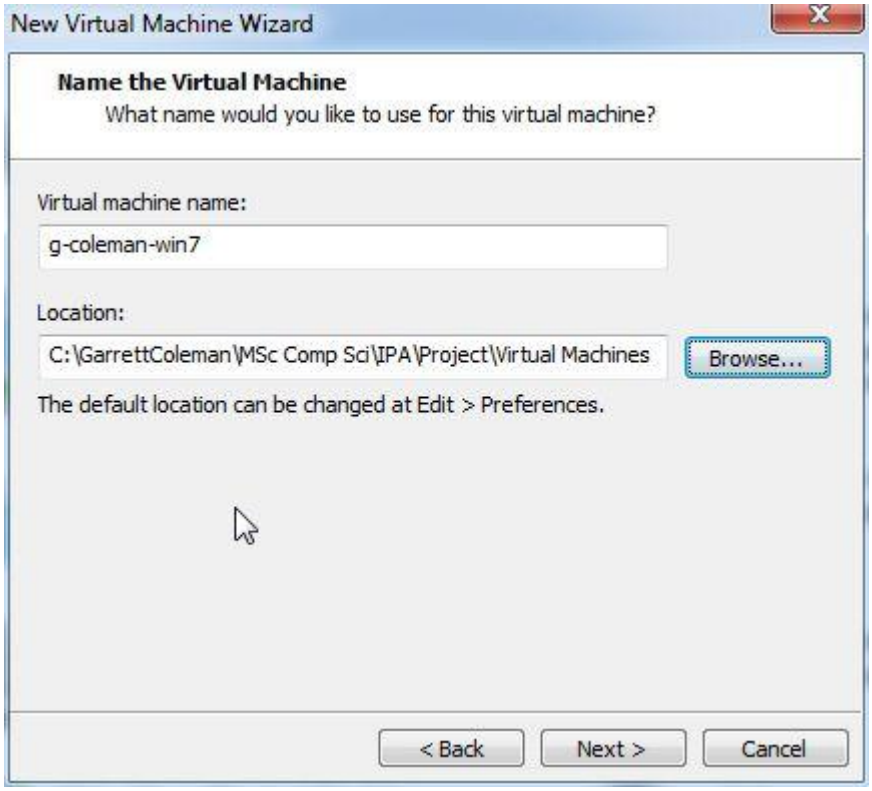
The first step is to launch the VMWare program and select "create a new virtual machine", which opens the new virtual machine wizard.

New Virtual Machine Wizard
Welcome to the New Virtual Machine Wizard
What type of configuration do you want?
Typical (recommended)
Create a Workstation 9.0 virtual machine in a few easy steps.
Custom (advanced)
Create a virtual machine with advanced options, such as a SCSI controller type, virtual disk type and compatibility with older VMware products.
VMware
Workstation 9
Help
< Back
Next >
Cancel

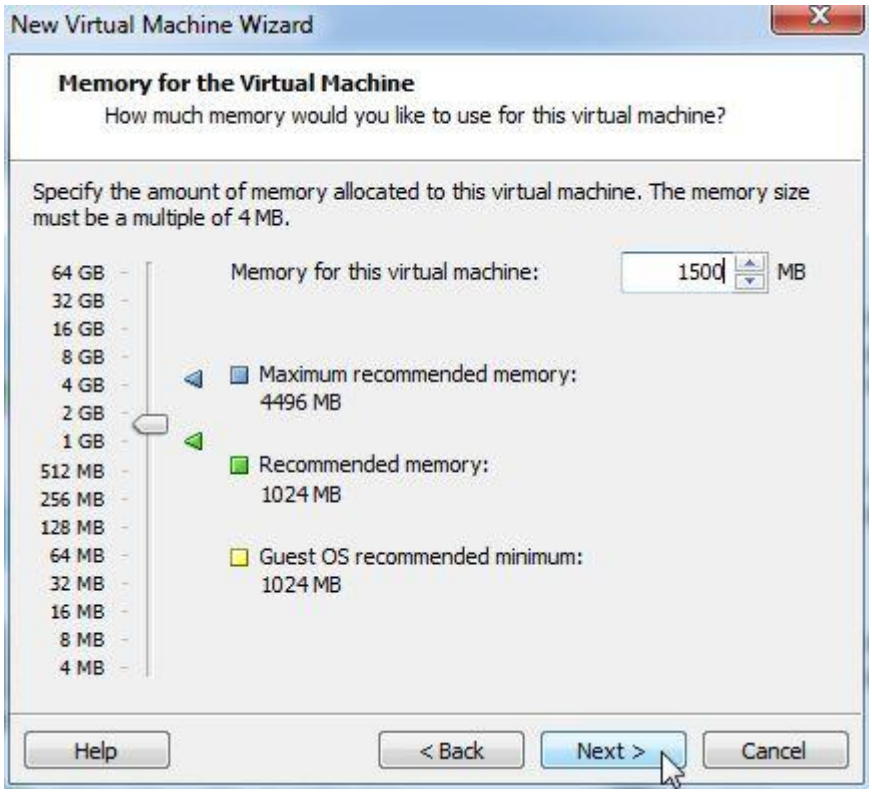
We select custom (advanced) configuration and click "next" to move to the next step.


New Virtual Machine Wizard
Guest Operating System Installation
A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?
Install from:
Installer disc:
DVD RW Drive (D:)
Installer disc image file (iso):
C:\GarrettColeman\MSc Comp Sci\IPA\Project\ISOs\er
Browse...
Windows 7 x64 detected.
This operating system will use Easy Install. (What's this?)
I will install the operating system later.
The virtual machine will be created with a blank hard disk.
Help
< Back
Next >
Cancel

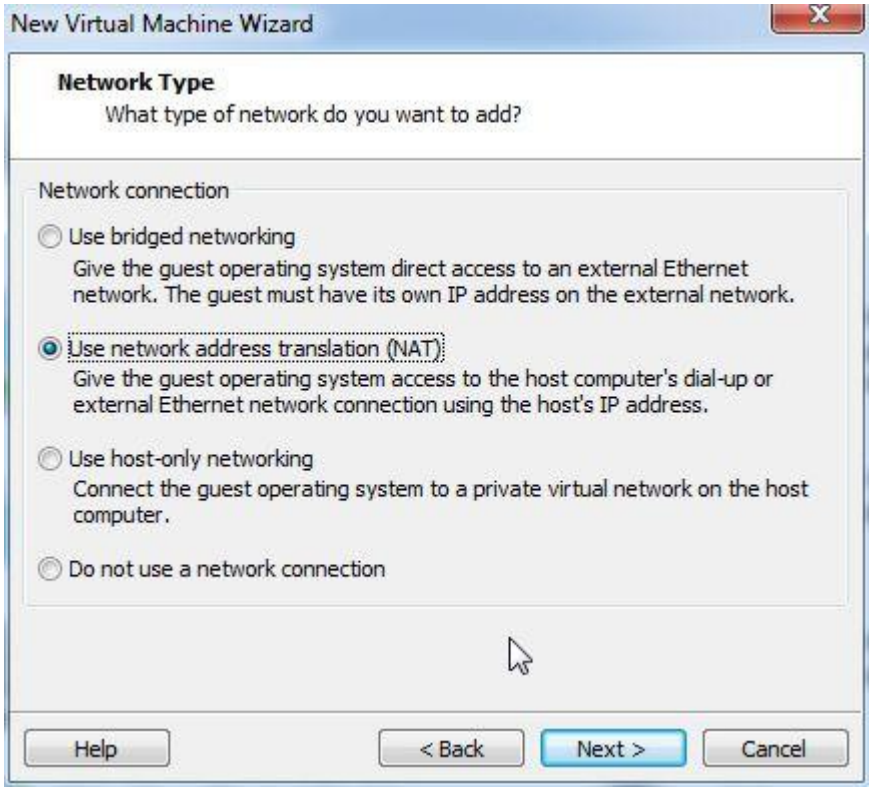
We will be using the Windows 7 Professional installer disc image file (iso) provided as part of this assignment, therefore we select that we will install the guest operating system from an ISO and browse to the location where we have saved it on the host computer's hard drive, and click "next" to move to the next step.


New Virtual Machine Wizard
Name the Virtual Machine
What name would you like to use for this virtual machine?
Virtual machine name:
g-coleman-win7
Location:
C:\GarrettColeman\MSc Comp Sci\IPA\Project\Virtual Machines
Browse...
The default location can be changed at Edit > Preferences.
< Back
Next >
Cancel

We name the virtual machine as g-coleman-win7, and browse to the folder where we wish the virtual machine to be saved to, and select "next" to move to the next step.



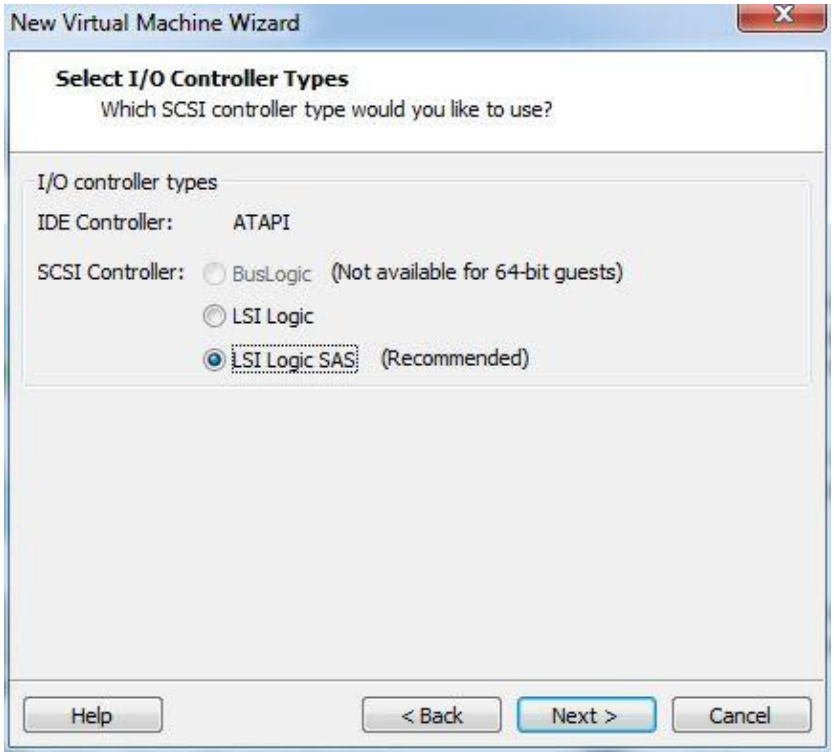
We specify 1500MB of memory to be allocated to the virtual machine, and click "next" to move to the next step.


New Virtual Machine Wizard
Network Type
What type of network do you want to add?
Network connection
Use bridged networking
Give the guest operating system direct access to an external Ethernet network. The guest must have its own IP address on the external network.
Use network address translation (NAT)
Give the guest operating system access to the host computer's dial-up or external Ethernet network connection using the host's IP address.
Use host-only networking
Connect the guest operating system to a private virtual network on the host computer.
Do not use a network connection
Help
< Back
Next >
Cancel

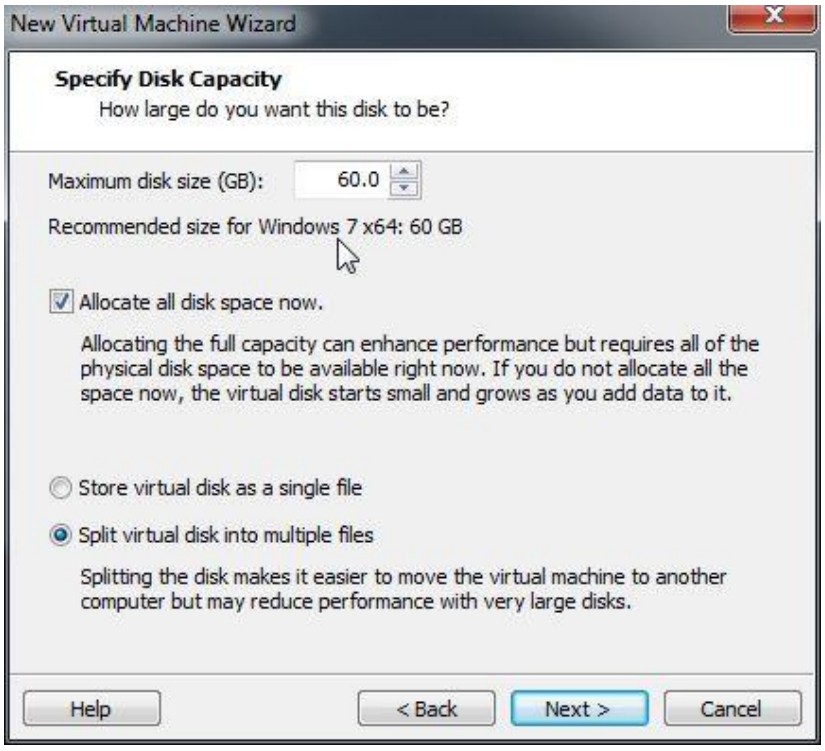
We next select network address translation (NAT) as the type of network we will use for the virtual machine.

Bridged networking connects a virtual machine to a network by using the network adapter on the host system, while with NAT networking, a virtual machine does not have its own IP address on the external network. Instead, a separate private network is set up on the host system.

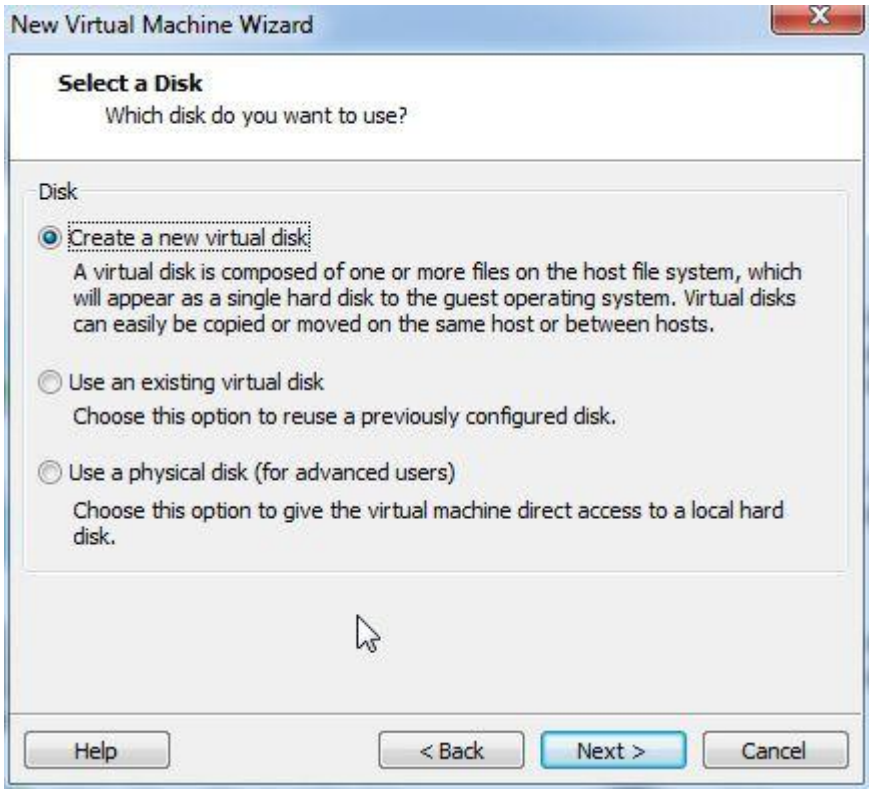
The virtual machine and the host system share a single network identity that is not visible on the external network. With bridged networking the VM requires it's own IP address from the network it is supposed to belong to, while NAT networking is often used when the amount of IP addresses in the external network is limited. As this assignment was largely being carried out at University College Dublin, where the author has experience poor wireless internet accessibility, the virtual machine was initially set up using NAT networking.



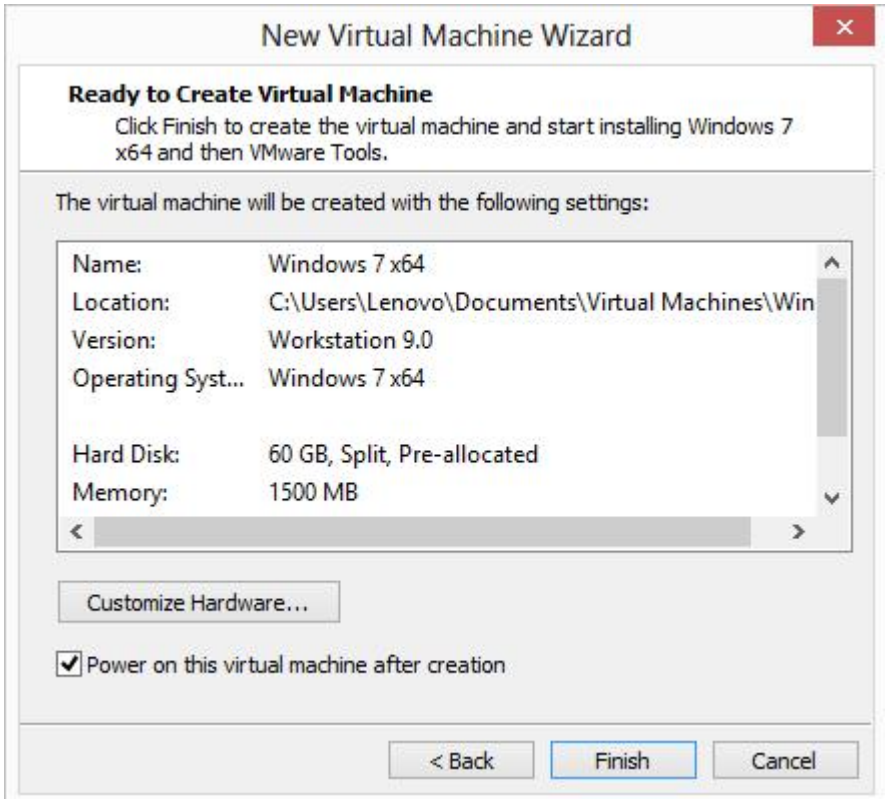
The standard recommended LSI logic SAS SCSI controller is selected, and we then click "next" to move to the next step.


New Virtual Machine Wizard
Specify Disk Capacity
How large do you want this disk to be?
Maximum disk size (GB): 60.0
Recommended size for Windows 7 x64: 60 GB
Allocate all disk space now.
Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
Help
< Back
Next >
Cancel

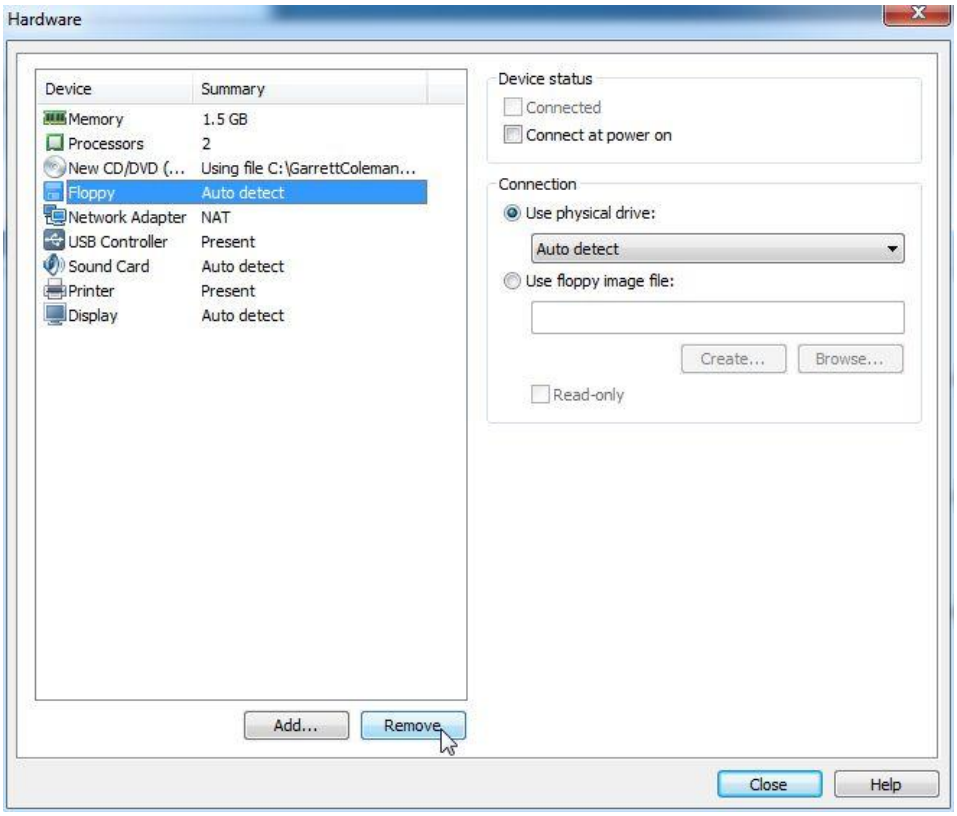
We specify the maximum disk size as 60GB as per the assignment instructions, tick to allocate all disk space now, and select to split the virtual disk into multiple files.


New Virtual Machine Wizard
Select a Disk
Which disk do you want to use?
Disk
Create a new virtual disk
A virtual disk is composed of one or more files on the host file system, which will appear as a single hard disk to the guest operating system. Virtual disks can easily be copied or moved on the same host or between hosts.
Use an existing virtual disk
Choose this option to reuse a previously configured disk.
Use a physical disk (for advanced users)
Choose this option to give the virtual machine direct access to a local hard disk.
Help
< Back
Next >
Cancel

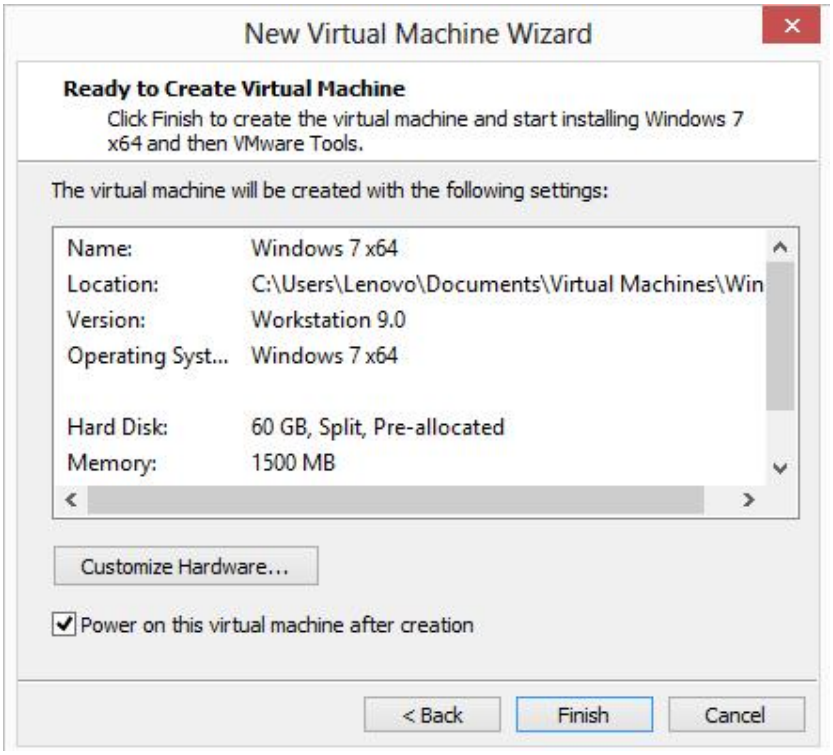
We select "create a new virtual disk" and click next to move to the next step.


New Virtual Machine Wizard
Ready to Create Virtual Machine
Click Finish to create the virtual machine and start installing Windows 7 x64 and then VMware Tools.
The virtual machine will be created with the following settings:
Name: Windows 7 x64
Location: C:\Users\Lenovo\Documents\Virtual Machines\Win
Version: Workstation 9.0
Operating Syst... Windows 7 x64
Hard Disk: 60 GB, Split, Pre-allocated
Memory: 1500 MB
Customize Hardware...
Power on this virtual machine after creation
< Back
Finish
Cancel

Before we click finish to finish the wizard setup we click on "customise hardware".



This opens a summary of the specification for the virtual machine that we are creating. We highlight the floppy device and click on "remove" to minimise unnecessary resource usage.


New Virtual Machine Wizard
Ready to Create Virtual Machine
Click Finish to create the virtual machine and start installing Windows 7 x64 and then VMware Tools.
The virtual machine will be created with the following settings:
Name: Windows 7 x64
Location: C:\Users\Lenovo\Documents\Virtual Machines\Win
Version: Workstation 9.0
Operating Syst... Windows 7 x64
Hard Disk: 60 GB, Split, Pre-allocated
Memory: 1500 MB
Customize Hardware...
Power on this virtual machine after creation
< Back
Finish
Cancel

We tick the option to power on the virtual machine after creation, and then click "finish". The virtual machine is now created and powers on, installing the Windows 7 operating system in the process. During the installation we select English as the language to install, we set the time and currency format as English (Ireland), and the keyboard or input method as Irish, and tick to accept the Microsoft license terms.